FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 155. (No. 50. Vol. III.)] DECEMBER 16, 1911. [Registered at the G.P.O. as a Newspaper.] [Weekly, Price 1d. Post Free, 1½d.

ANCIENT AND MODERN.—Unique photograph of a Bristol monoplane in flight at Salisbury Plain over Stonehenge.

EDITORIAL COMMENT.

Evolving the Military Aeroplane.

If the War Office has not been in any great hurry to announce anything in the shape of a definite aeronautical policy, it is not because there is not a very advanced school of military aerial thought among us. In a detached sort of way, the public has been made aware that some interest is being taken by a few of our soldiers in the problems affecting aerial supremacy, but the work that has been done and is still in the process of doing has been so quiet that its real magnitude has been to a great extent missed. To the rejuvenated Aeronautical Society is certainly due a meed of gratitude for having brought into prominence the vast amount of interest that Service people are taking in the subject of the military aeroplane and its possibilities for use in the wars of the future. The Society's meeting at the Royal United Service Institution a few days ago was not only valuable as an earnest of the manner in which our oldest aeronautical body is following the trend of development, but was even more valuable as an indication of the close thought that is being bestowed upon the problems of the air by many of our Service officers.

Major-General R. M. Ruck, who occupied the chair, whose opportunities for furthering military aviation have been less than his desire to do so, was eloquent in his opening address of that close study of the question of which we have already spoken, and he showed a grasp of the whole subject that must have been exceedingly gratifying to many of those who have held the opinion that aviation is a subject with which the higher officers of the two Services have not materially concerned themselves except as scoffers. He made an interesting point, and one from which we are inclined to take much hope for the future. It was the first time, he said, that within his recollection military officers had met in discussion across the floor with the designers of any weapons or appliances which they would have to use in war. And this, he observed, is an altogether admirable beginning, from which much good is bound to eventuate. Because this has never happened before, it does not necessarily mean that our soldiers are so conservative and bound by tradition that they do not want to discuss matters with the designers of their weapons, but from the evidence of the Aeronautical Society's meeting it would seem as if lack of opportunity has alone barred the way.

It must be remembered that hitherto the development of weapons and appliances of war has been very largely a question of the gradual evolution and improvement of already existing types, and there has consequently not arisen the pressing necessity for those who have to use them to meet in discussion those who make them. But the aeroplane is not a development of anything—it is something new and entirely apart from all that has gone before, and hence it is in an entirely different category from all other weapons and warlike appliances. Its exact functions in war have not even been roughly defined with authority; it is still in embryo, capable of almost infinite improvement, it may be. No one has any very definite ideas of what the future type of war-plane will be like; and so it is desirable, even essential, that those who will use and those who will construct it should come together and learn each the view of the other. Again we say that in arranging this discussion the Aeronautical Society has done well by itself, the industry, and the country.

It is not our purpose here and now to traverse the whole of the discussion, particularly as it will be resumed on Monday next, or even to draw any very concrete conclusions from it, for the same reason. But this much is evident, that the military students of aviation have some very decided views of their own as to the requirements to be exacted from the military machine, even in its present stage of development. They are not impossible requirements, but such as are well within the scope of the present-day designer. Col. Capper, who has done a very great deal for military aeronautics, laid it down, in opening the discussion, as a first essential that the military aeroplane should be regarded as a means of reconnaissance rather than a fighting vehicle, and that although it would be desirable to arm it with some light gun, its use would materially be concerned with the work of securing information, or, what is equally important, preventing the other side from obtaining it. If the gun is admitted as a *necessity*, then something in the way of automatic, or nearly automatic, stability is of first importance, in order to secure a reasonably steady gun-platform. Up to the present, we have not made much apparent progress in this direction, but it is undoubtedly a direction in which there is much room for research and experiment.

There were a good many other points raised in the course of the discussion, but we have simply taken this one as an instance of how these round-table talks help towards a mutual understanding of what is required and what can be given. We get the two sides together, the soldier-aviator who knows exactly what he wants to best serve the purpose he will be called upon to achieve in war, and the constructor who knows the limitations of present-day design and knowledge, and is thus able to say to what extent he can comply with the expressed desires of the other party to the discussion. Hints are given and received by both which cannot fail to be productive of much good all round. So far we have only heard a part of what the military aviators have to say upon the question of exactly what it is they want for efficiency. Doubtless, on Monday next, at the resumed discussion, we shall be told how far the designer is able at the moment to comply with the demands made upon him, and we may say, incidentally, that we shall be surprised if he is not able to announce that he is sanguine of fulfilling most of the essentials. With that we must leave the subject for the present.

⊛ ⊛

New Rules for International Michelin Cup.

NEXT year's competition for the International Michelin Cup is to be much more severe, and a somewhat novel test has been proposed. Instead of a straight out and home course across country, it is suggested that the competitors should cover three circles, of 500 kilometres each, arranged in the form of a trefoil with the centre at Paris. Landings for replenishment would be allowed after each circle, while to encourage passenger carrying, a bonus of 25 per cent., up to 100 per cent., would be added to the prize for each passenger carried.

⊛ ⊛

Landing in *Brevet* Tests.

IN considering the rules for pilot aviators' certificates, the Fédération Aéronautique Internationale, at its recent meeting at Rome, came to the decision that the rule with regard to landing (*i.e.*, that the machine, with motor stopped, must come to rest within 50 metres of a pre-arranged spot) must be interpreted so as to mean when the machine actually comes to rest, and not merely when it touches the earth. It is most essential, of course, that aviators should know how to pull up their machines after landing.

A Study of Bird Flight

By Dr. E.H.Hankin. M.A. DSc.

CHAPTER XXXIX.—"Ergaer," the Physical Basis of Soarability.

IT will be of interest to review briefly the facts that have been described in order to see what general conclusion can now be drawn as to the nature of soarability.

The first and chief question is what is the source of the energy involved? In answer to this question, there are, in the first place, two distinct possibilities to be considered. Either the energy is furnished by the bird, or, on the other hand, it is furnished by the air. The idea that the energy of soaring is due to the bird, that is to say, that it is derived from minute and undiscovered movements of the wings is, I think, excluded by the following facts. Firstly, soaring flight usually commences at a definite time of day, differing for each species of bird. It is impossible to imagine why a bird should be able to make minute movements, as suggested, after a definite time and not before it. Secondly, the idea is excluded by the complicated relation of cloud shadow to soarability. Thirdly, the idea does not harmonise with the discovery of different kinds of soaring flight in which the wings have different dispositions, and in which, as has been proved, different amounts of energy are involved.

Therefore, we are obliged to accept the alternative, namely, the view that the soaring bird gets its energy from the air. Here again we are confronted by two possibilities. Before the bird makes use of this energy, this energy must be in the air. It may be present either as the kinetic energy of moving masses of air, or, on the other hand, it may be present in the form of potential energy, that is to say, stored up in some structure, which structure, by decomposing, liberates the energy required for soaring flight. Let us consider these possibilities in order.

The suggestion that we are dealing with the energy of moving masses of air must be split up into two possibilities, which we may consider separately.

Firstly, it is conceivable that the soaring bird takes advantage of ascending currents reflected upwards from the walls of high buildings, &c. This suggestion becomes improbable in view of the extraordinary regularity of soaring flight as was exemplified in Chapter XI in a description of the circling of cranes. Secondly, the statement often dogmatically made that soaring birds show skill in finding and taking advantage of ascending currents is absolutely opposed to the facts in the case of vultures and adjutant birds. In Agra, if there is a wind, ascending currents are reflected upwards from the walls of high buildings such as the Taj and the Fort. The lighter birds, namely, cheels and scavengers, do take advantage of these currents especially when the air is not soarable. But this is not the case with the heavier birds. Vultures and adjutants, if they show any skill in the matter, do so, not by finding, but by avoiding such currents. On one occasion I saw some vultures apparently circling in the ascending current over the Fort. I at once went in my motor to investigate, and found that the vultures were not over the Fort but were circling a few hundred yards beyond it. They had merely appeared to me to be over the Fort because my point of observation, the Fort, and the vultures, were in one straight line, which line made a right angle to the wind direction. Vultures may be seen circling everywhere over the city of Agra with the single exception that they avoid the ascending current reflected upwards from the fort walls. It would be a very difficult proposition to defend that vultures, that avoid with skill ascending currents known to exist, have skill in finding other ascending currents that are not known to exist.

The second possibility is that soaring birds take advantage of those ascending currents that I have described as "heat eddies." These ascending currents are of small size, and so far as the evidence goes, uniformly distributed. In these two respects heat eddies fulfil a necessary character of the physical basis of soarability, as the regularity of soaring flight is explicable if due to minute and uniformly distributed rising currents. I have shown that the morning development of soarability frequently coincides in time with the development of heat eddies. But we have been brought to the conclusion that this correspondence is due to the fact that both soarability and heat eddies are due to the same cause, namely, sun energy. That there is no direct causal relation between the two phenomena is proved by the following facts. Under certain conditions air may be completely unsoarable in the presence of heat eddies. Secondly, air may be soarable in their apparent absence. This has been observed not only in Agra but also in Naini Tal, where the presence of the slightest eddy movement in the air, had such existed, would have been revealed by the movement of the cloud masses. Therefore it is impossible to see how heat eddies can be the cause of soarability. It is highly improbable, and in a sense inconceivable, that there should be a second set of ascending currents, also of small size, and also uniformly distributed, that could subserve soaring flight.

We have seen that the relation of the centre of area of the wing to the centre of gravity in slow flex-gliding could be explained by ascending currents. But the same line of argument that leads to this conclusion also leads to the conclusion that the relation of the area to the centre of gravity cannot be explained by ascending currents in the case of fast flex-gliding.

The disposition of the wings of the bird when in an ascending current of moderate strength has been described, and has been shown to be different from the disposition assumed in circling and fast flex-gliding. On one occasion in a stormy wind I saw a cheel travelling horizontally for a few seconds with wings dihedrally down and with the tail furled and elevated. This is the disposition usually employed for gliding downwards at speed. Its use in this case may be explained by supposing that the bird was, for a few seconds, in a strong ascending current. Thus, observation of the disposition of the wings may, to a certain extent, give information as to whether or not the bird is subjected to an ascending current, and, in fact, such observations show that in ordinary soaring flight ascending currents, capable of affecting the bird, are absent.

Therefore there is no evidence whatever in favour of the view that the energy of soaring flight is derived from the kinetic energy of air in movement independently of the bird's wing. There is a good deal of evidence against this view.

Thus we are led to the conclusion that the energy used in soaring flight is stored up in the air in potential form. There must be some substance or structure in which this energy is stored. For this unknown physical basis of soarability I propose the name "ergaer." The name no more implies that the matter is understood than does the name "protoplasm" imply that we know the nature of life. In one case, as in the other, the name stands for an unknown thing which is a subject of discussion.

In an earlier chapter I permitted myself to make a sarcastic remark about an observer who said that soaring flight was due to "levitation." Perhaps a critic may make a sarcastic remark about another observer who says that soaring flight is due to "ergaer." But the difference between the two cases is this. The author of the idea of levitation regarded it as a final explanation of soarability and implied that further research is unnecessary. On the other hand, ergaer is presented as the subject of a research that has only just begun, a research too in which I have little hope of being able to play a part. Mere scraps of time, such as I have been able to devote to cataloguing the bare facts relating to soarability, are quite insufficient for carrying out the serious experimental research that is now urgently required if the matter is to be carried further. The resources of a physical laboratory are needed to throw a light on the hundred questions that demand an answer. Is ergaer an unstable gaseous compound, or some allotropic modification of one of the gases of the air? Or does it consist of clusters of molecules that can fly apart, liberating energy, when disturbed by the passage of a vulture's wing? Or are we dealing with minute eddies whose circular motion is changed to tangential motion by the disturbance in question? What are the exact conditions under which ergaer is formed or decomposed? Perhaps the answers to such questions may lead to results of practical importance. If so, after the observer and experimenter, it will be the turn of the engineer, who, perhaps, cannot experiment, but who can design and construct. And, lastly, the general public, who can neither observe nor experiment, nor design, will reap the benefit.

Thus we have reached the conclusion that the air under the wing of a soaring bird is undergoing a change of the nature of a sort of continuous explosion. This view is perhaps unexpected and surprising. But the question arises whether it is the only case in which a change of potential to kinetic energy takes place in the air. The appearance of a gust of wind is only less surprising than soaring flight because it is so familiar. On a calm morning, before heat eddies have developed, a gust of wind arises and dies away in the absence of any apparent cause or reason. Evidence is completely lacking that energy from any external source is the cause of the

phenomenon. Now that we know that energy can be stored in the air in potential form, it becomes probable that this stored energy is the cause of wind, or of some kinds of wind, besides of soarability. It seems hardly likely that air possesses two distinct mechanisms by which energy can thus be stored. Hence we may expect that evidence will be obtained that ergaer is the cause of some kinds of wind besides being the source of soarability. On general grounds we may expect that evidence bearing on this possibility would be hard to find in settled weather or in constant winds. But in the presence of gusts, and at the time of a change of season, we may hope to observe phenomena indicating some connection between soarability and wind. It will be seen in the sequel that the study of "disturbed weather soarability" and "storm soarability" does lead to some evidence in favour of this suggestion.

But the knowledge of soarability now obtained puts us in a position to appreciate some evidence I have to put forward bearing on the functions of the wing-tips, to which subject the next few chapters will be devoted.

CHAPTER XL.—The Angle of Incidence.

In the case of aeroplanes the wings have a fixed position in relation to the direction of pull of the engines. The angle of incidence is therefore definitely settled before the aviator leaves the ground. So far as the direction of movement of the aeroplane is due to the pull of the engine there is no change in the angle of incidence during flight.

The bird, lacking a motor, has no such definite and simple method of maintaining its angle of incidence.

Let us consider an imaginary case of a bird suspended by a string attached to it at its centre of gravity. Let us further suppose that the air surrounding the bird is destitute of movement. We will suppose that the wings are stretched out horizontally in the position they assume during ordinary gliding flight. Under such conditions the bird has no difficulty in rotating its wings round their long axis. The axis round which the wing rotates is very near its anterior margin. Supposing now the air surrounding the bird is set in motion and that the bird faces the air current, and let us suppose further that the wings lie in the horizontal plane so that there is no angle of incidence. If the bird now commences to rotate the wings upwards, that is to say, in such a direction that their posterior margins go downwards, then the air begins to press on the underside of the wing. The centre of this pressure is somewhere between the centre of area and the anterior margin. The position of this centre of pressure will vary under different known conditions. In slow flight, at all events, this centre of pressure must be situated behind, that is to say, posteriorly to the axis round which the wing rotates. From this it follows that, if no other factor intervenes, rotation of the wings in one direction may result in rotation of the body in the opposite direction. We have, therefore, to consider by what means a bird can maintain or change the angle of incidence of its wings during flight without subjecting its body to rotation round the transverse axis.

Let us first consider the case of a bird at the commencement of a period of gliding when in flap-gliding flight in unsoarable air. Let us imagine that the bird is travelling horizontally. The bird is being acted on by the four chief forces. Of these the "lift" and the "weight" act at points, one vertically above the other, as elsewhere explained. The other two forces are the "pull" and the "drag." The "pull" consists of the momentum of the bird. This acts in a horizontal direction at the centre of gravity (see Fig. 68). The "drag" consists of the resistance of the body of the bird to passage through the air, plus the resistance due to the action of the air on the wings. The "drag" must therefore act in a horizontal direction backwards. It probably acts at a point slightly above the level of the centre of gravity. But its exact position, that is to say, the position of the "drag centre," is unknown. In slow-flapping flight the head end of the bird rises during the down stroke and falls during the up stroke. The transverse axis round which this rotation occurs probably passes through the "drag centre." In flapping-flight there is an increase of transverse axis and dorso-ventral axis stability. These facts suggest that the "drag centre" is situated posteriorly to the centre of gravity. Just as the "lift" and the "weight" act at two points some distance apart, one above the other, so, that is to say, it is probable that the "pull" and the "drag" act at different points, one behind the other, thus conferring a small measure of natural stability.

Since the "drag" consists not only of the resistance due to the action of the air on the body, but also of resistance due to the action of air on the wings, there can be little doubt, that, under the conditions described, it is situated on a slighty higher level than the centre of gravity. If this is the case there must be a couple between the "pull" and the "drag" that tends to rotate the bird upwards round its transverse axis, in other words that tends to maintain the angle of incidence.

When a bird is gliding in unsoarable air with loss of height it is probable that no other factor intervenes to maintain the angle of incidence.

But suppose the bird was to glide into a patch of soarable air and was to continue gliding with wings at full camber. Then, under these conditions, the "pull" would no longer act at the centre of gravity. It would no longer consist of the momentum. It would consist of the tractive effect of soarable air on the cambered wing. That is to say the "pull" would act on a level with the wings. (Fig. 72). Hence the above described means of maintaining the angle of incidence would no longer be operative. Apart from the wing tips, the wings act, not as a resistance, but as a source of tractive effort. Hence the "drag" consists, not of the action of the air on the wings plus the resistance of the body of the bird to passage through the air as before. It consists of the last mentioned factor plus such resistance as may be derived from the wing tips.

The question we have to solve is how the angle of incidence is maintained in soarable air with the wings at full camber. Facts in my possession tend to show that this function belongs to the phalangeal quills. If a bird is gaining height, with wings at full camber, the wing tips are rotated upwards. The air pressure on the underside of the phalangeal quills must tend to lift up the anterior margin of the wing. (See Figs. 62 and 63.) A proof of the truth of this assertion will be found in the fact that the degree of upward rotation of the wing-tip is proportional to the amount of energy being taken from the air. Before describing the facts on which this assertion is based, it will be convenient to consider the position of the wing-tips in flex-gliding.

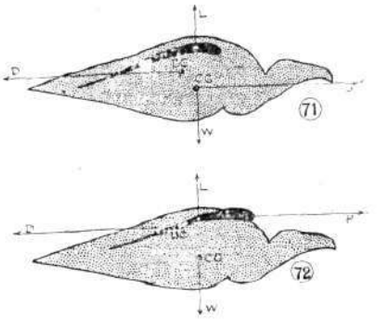


Fig. 71.—Vulture flap-gliding in unsoarable air at commencement of a glide. P pull, D drag, L lift, W weight, CG centre of gravity, DC drag centre.

Fig. 72.—Vulture gliding in soarable air with wings at full camber. P pull, D drag, L lift, W weight, CG centre of gravity, DC drag centre.

In flex-gliding the wing-tips are retired by flexing at the carpal joint. When viewed from below, the phalangeal quills are seen to be directed backwards and outwards. But when the bird is viewed from the side, the phalangeal quills appear to be bent upwards, as shown diagramatically in Fig. 74. This is not always easy to see. If the bird is seen from behind, the tips, owing to their position, appear foreshortened, and the full extent of their upward bend is not apparent. When the bird is gliding past, giving a broadside on view, and especially after it has passed the exact broadside on position, the phalangeal quills of the near wing can be seen to be strongly turned up, but only a slight turning up of the far wing-tip is visible. This again is obviously owing to foreshortening. I have often watched a flex-gliding bird while travelling in a straight line for long distances, probably as much as a mile or more, and have been able to see the quill feathers of the near wing bent up and destitute of any sign of movement. I recently observed a black vulture fast flex-gliding at an unusually short distance. It passed me broad side on. As it was coming up to this position, I distinctly saw the curvature of each individual feather, as indicated in Fig. 74. The fact that the quills were curved and not straight, proves definitely that their position was due to air pressure and not due to rotation of the wing. That a considerable force is necessary in order to produce the curvature observed, is indicated by the following measurements :—

An adjutant of 9 ft. 6 ins. span was placed lying on its back on a table. It was found that the following weights were necessary in order to make the quill feathers lie flat.

1st primary quill...	20 grammes	5th primary quill...	90 grammes
2nd ,, ...	30 ,,	6th ,, ...	70 ,,
3rd ,, ...	60 ,,	7th ,, ...	10 ,,
4th ,, ...	60 ,,	8th ,, ..	0 ,,

Obviously, in order to bend the quill feathers further, that is to say, beyond the flat position to the position observed in flex-gliding, much greater weights would be required. In the case of the quill feathers of the dried wing of a vulture, I found that weights approximating 150 grammes were necessary for the purpose. The weights were placed two or three inches from the end of each feather.

These observations indicate a method by which the force exerted by ergaer might be measured. In the first place it would be

necessary to get accurate information as to the actual amount of deflection of the phalangeal quills. This might possibly be done by photographs taken with a telephoto lens. Then it would be necessary to hold the quills in an air-current and find what current-speed was necessary to cause a deflection identical with that observed in flex-gliding. But, even in the absence of such accurate data, the facts now brought forward indicate that the force exerted by ergaer is greater than could be yielded by "heat eddies" or by any ascending currents whose existence could reasonably be assumed.

I have already stated that when circling in fully soarable air, with effort to gain weight, the wings are advanced and placed in a dihedrally-up position. Obviously, this disposition must place the wing-tips in the most favourable position for influencing the angle of incidence (Fig. 63). If the bird is circling without effort to gain height, the wings are not advanced, but straight. Also the dihedrally-up angle is reduced. With this disposition the wing-tips are in a less favourable position for affecting the angle of incidence (Fig. 62). In both these cases the wing-tips are kept rotated upwards to their fullest extent, and the phalangeal quills are lifted by the pressure of the air to different degrees, as shown in a previous chapter, in Fig. 23. Supposing the bird circles with the wing tips rotated upwards to lesser amounts, then less energy is taken from the air, as illustrated by the following observations :—

August 29th, 1911, at 4.25.—A vulture seen descending slowly. Its wing tips were only slightly rotated upwards. The first phalangeal quill could be seen to be slightly turned up. It remained with the wing tips in this position during the whole of its descent. It took nearly ten minutes to descend through 300 metres. It was descending in circles and was in the direction of the Taj.

4.30.—Another vulture descending. Its wing tips were flat, but not retired (indicating that the angle of incidence was not so much diminished as in metacarpal descent). It took two or three minutes to descend through 300 metres.

Owing to the natural curvature of the quill feathers, air must be exerting some pressure on their under sides for them to assume the flat position. As elsewhere described, in metacarpal descent, besides being flat, the wing tips are retired, thus still further diminshing their action in maintaining the angle of incidence.

In the above cases the same disposition of the wing tips was assumed for each wing. In the following two observations I saw the effect produced by rotation of a single wing tip :—

19th August, 1911.—At Jharna Nullah. 6.0 p.m.—Wind moving small branches. Some eagles seen flap-gliding. Twice a wing tip rotation was seen to be followed by a small decrease of the angle of incidence of the wing.

In each of these cases, a steering effect was produced. The wing tip rotation was small, not sufficient to produce a typical dip movement. Neither was there any appearance of a wing depression. The following is a similar observation :—

October 8th, 1911.—At Jharna Nullah. 10.0.—Wind south moving leaves. 10.38.—A vulture made a slight wing tip rotation. This was seen to be followed by a decrease of the angle of incidence of the affected wing.

I was particularly fortunate in being able to make this last observation. I had never expected to be able to see this movement in a vulture. I was seated in a slight depression in the ground, within about ten yards of one or two hundred vultures that were busily eating carrion. Many vultures were descending or gliding near me at low levels.

We are now in a position to understand the cause of the steering effect produced by a dip movement. The evidence now brought forward indicates that the steering action is due to the inside wing being given an angle of incidence inappropriate to its camber. Some facts to be described in the next chapter will be found to be in harmony with this conclusion.

My observations have therefore led to the belief that the wing-tips have two functions. First, steering in the horizontal plane. This is produced by rotation downwards of one wing-tip, with consequent loss of speed of the wing, whose tip is rotated. Secondly, maintenance of the angle of incidence, both in soarable air and when flap-gliding, with effort to maintain or gain height.

Presumably, the fact that the primary quills are separate, aids the lifting effect, while presenting less resistance to forward movement through the air than would be the case if these feathers overlapped.

A further and welcome proof of the correctness of the above views of the functions of the wing-tips would be obtained if they led to an explanation of the movements of the deformed vulture, described in Chapter XXV. Though it is possible to make a vague guess as to the reason of the disposition of its efficient wing-tip there described in the light of the present knowledge, it appears to me that, before a final conclusion can be arrived at, we must know more about the play of forces in circling, and also obtain further information as to the exact nature of the deformity. The vulture in question when seen in 1911 was found to have the same deformity as when first seen in 1910. (*To be continued.*)

⊛ ⊛

Flying at Night by Searchlight.

A CORRESPONDENT sends us the following interesting account of a night in America by Mr. George M. Dyott, a member and pilot of the Royal Aero Club :—

"The sensation of the week ending October 28th at the Nassau Aerodrome in New York was the ascent by night of two Englishmen, Mr. George Dyott, with Captain Hamilton as passenger, in a Deperdussin monoplane. With the aid of a powerful searchlight attached to the running gear of his aeroplane and connected by electric wires, Mr. Dyott flew all about the vicinity of the Nassau Aerodrome and landed without even straining a wire.

"The other machines had been in their hangars for some time, and all was a thick inky darkness when Mr. Dyott ended his remarkable flight. Captain Hamilton manipulated the searchlight and picked out a landing for Mr. Dyott near his hangar.

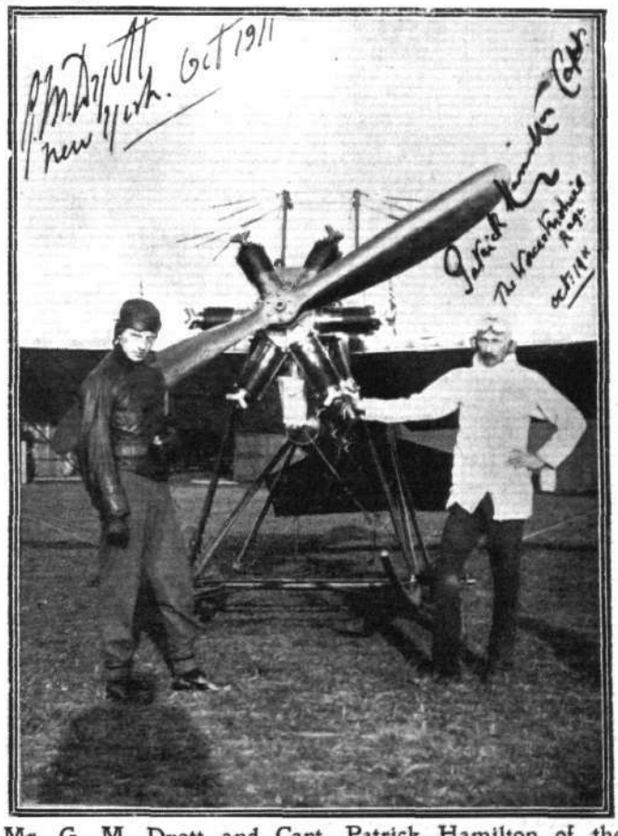
"The aeroplane presented a most remarkable appearance in the dark sky with the searchlight sending its rays in all directions. At times the light would be shut off, and except for the throbbing of the motor the location of the aeroplane could not be determined. As the monoplane came down from a height of 300 feet the searchlight was turned towards the ground, and the spectacle resembled a monster shooting star rushing earthward.

"Captain Hamilton, who has had much experience in aeronautics in England and France, declared the experiment to be a marked success, and that it would be but a short time before aeroplanes would be flying at night whenever occasion required.

"Mr. Dyott took his *brevet* at the Blériot School of Aviation at Hendon last summer, and afterwards spent several weeks in France at the Deperdussin School of Aviation; from there he went to the magnificent works of the Deperdussin Company, and watched the building of the two fine machines which he and Captain Hamilton took with them to America.

"Mr. Dyott and Captain Hamilton left New York on November 1st for Mexico City, where they have arranged to fly for a month."

⊛ ⊛



Mr. G. M. Dyott and Capt. Patrick Hamilton of the Worcestershire Regiment, who have been flying so well in America after learning to fly in England.

THE FILEY DISASTER.

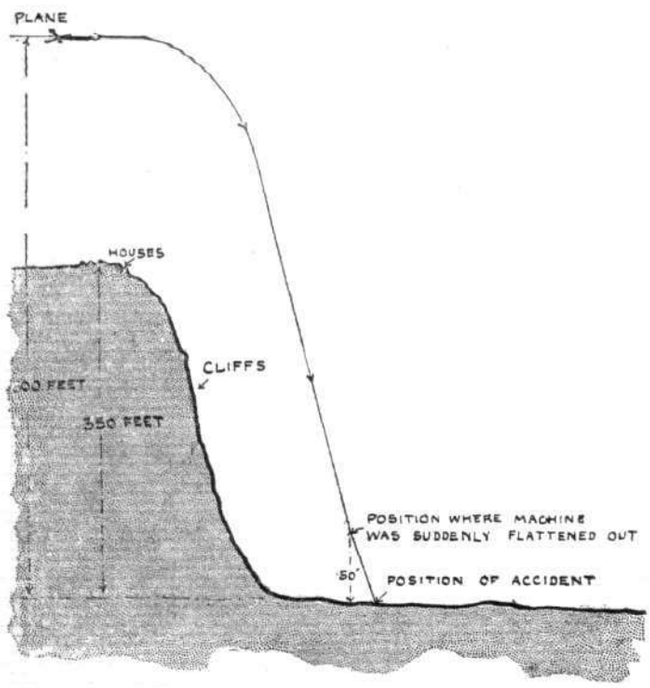
FROM Mr. R. Blackburn we have received the following very valuable communications bearing upon this most regrettable disaster, which we very briefly recorded last week.

Mr. Blackburn writes:—

"With reference to Mr. Oxley's terrible accident, I am enclosing a letter from Mr. Hunt, and after going through all the facts myself, and considering the description of the accident by people who saw it, there is undoubtedly only one conclusion to be drawn from it. It appears that Oxley was very fond of making sudden and steep descents at a very acute angle, and had lately done a great many of these from moderate heights with several of the Aerodrome men as passengers.

"You will quite understand that when making one of these steep descents and suddenly flattening the machine out, the strain must be enormous. Although the manœuvre has been successfully accomplished many times by Oxley, yet there is a height from which velocity at the end of the dive would be so great that no machine could possibly stand it. These descents had no doubt given him such self-confidence that neither he nor others seem to have really realised the danger.

"The facts are that in this case he did a sudden dive over the town of Filey, from a height of 600 feet. Considering the position from which he started to descend and the position on the sands where he finally fell, the angle could not have been any other



Outline map of Oxley's flight.

than very acute, as the machine was wrecked only about 100 feet from the cliffs side. At this point the cliffs and houses at the top are about 350 feet high.

"It is thought that it was his intention to dive down in this manner and then flatten out and fly back to the hangars. I think there can be no doubt that this dive was intentionally done, as two or three of the observers saw him distinctly flatten the machine out and plunge, as it were, forward, at the same time the whole 'plane giving a violent tremble and bursting. One of the onlookers saw bits of wood fly from the planes, which seems to point to the conclusion that they were burst. In any case there is no doubt that until within about 50 feet of the ground the machine was quite safe.

"I am enclosing a few figures showing to some extent what strain has been brought on the machine, and although I have not considered these before the accident, I think they are correct approximations and will show the appalling magnitude of the strain on the planes when instantaneously flattened out at the terrific speed which necessarily must be attained after such a dive from that height.

"I shall be very much obliged if others would give their opinions, as I feel sure that no aviator realises the danger in this method of descending.

"You can imagine what a terrible gloom this has placed on Filey, where Oxley had gained great popularity. He was without doubt a brilliant flyer and had no sense of fear, but unfortunately he cannot have grasped what danger he was running when attempting these dives.

"Remarkable to say, I have only learnt since his death that he was in the habit of doing these things, as on every occasion when I have been at Filey he has made more or less normal descents. It seems hard to blame him in such a case, but there is no doubt he was rather fond of giving the onlookers a sensation, and I have been told on many occasions how people have thought that he was rushing down to his death.

"I am relating this purely as it has been related to me so that your readers can form their own opinions, and I believe you will agree with me that a few facts and figures to show the enormous stresses that necessarily must result from such descents are wisely published as a warning to others."

Calculations.

The following are Mr. Blackburn's calculations referred to in his communication:—

Assuming the plane to be diving down from a height of 600 ft., irrespective of any resistance caused by planes, then velocity after descending 550 ft., *i.e.*, 50 ft. from ground when he was seen to level up.

$$V = \sqrt{2gh}$$
$$= \sqrt{2 \times 32{\cdot}2 \times 550}$$
$$= 188{\cdot}2 \text{ ft. sec.}$$
$$= \frac{188{\cdot}2 \times 60}{88} = 142 \text{ m/hr.}$$

but the initial velocity = 65 m/hr.

$\therefore$ final velocity = 142×65

= 207 m/hr.

In all probability due to resistance caused by angle of planes, the velocity would not be so great but it is certain that it was terrific, but assuming this velocity the pressure per sq. ft. per normal plane,

i.e. $P = {\cdot}003V^2$ approx.

$= {\cdot}003\ (207)^2$

= 129 lbs. approx.

Area of planes = 290 sq. ft.

$\therefore$ total pressure on planes = 290×129

= 37410 lbs.

or = 16·7 tons.

Again, weight of machine = 1,350 lbs. and effective stress when abruptly flattened out to horizontal.

$= 2 \times 1{,}300$

= 2600 lbs.

or = $1\frac{1}{4}$ tons nearly

$\therefore$ total stress on planes = 18 tons nearly.

[Copy of the letter received from Mr. A. Castle Hunt.]

On examination of the wreckage of the Blackburn Aeroplane, after the regrettable accident at Filey on December 6th, and after taking into consideration the position of the debris together with the position and height of cliffs and houses, over which the aeroplane came in its flight, there is only one conclusion to be arrived at, and having had several flights as passenger in this same machine under similar conditions with the latter, Mr. Oxley as pilot, I found that it was his habit of descending with a *vol piqué* at an angle of 65 degrees, which imposes on the machine a terrific strain when the machine is flattened out previously to landing. On my last flight with Mr. Oxley in the above machine he landed from a height of about 250 ft. in the above manner. He afterwards asked my opinion on his steep descents, I remarked that I admired his flying and the perfect control that he had over the machine, but at the same time I warned him of the extreme danger of such descents if carried out from any great height, as I was certain that an aeroplane of such size and weight as this machine could not possibly stand the strain when flattened out for landing, no matter how strong the machine was built. Unfortunately he did not realise how serious this was, and laughingly replied, "Oh, I always land this way."

Further than this, on the evening before the accident, Mr. Oxley remarked that if the weather was favourable on the following morning he would make a flight around Filey previous to starting for Leeds to give the district an exhibition of what trick flying he could do. He started away on the morning of the accident, leaving the hangars about 9.40, making a straight flight to Filey, a distance of about 3 miles over the sands at an altitude of 150 ft. Landing at Filey he taxied the machine to turn it round, then flew back towards the hangars, which he passed at an altitude of 250 ft. Proceeding onwards for about a mile, gaining an altitude of 350 ft.,

he made a right-hand turn inland, and passing over the cliffs proceeded again in the direction of Filey. Gradually getting higher and higher he passed over the town of Filey at an altitude of 600 ft. or more above sea-level; allowing about 300 ft. for the height of the cliffs upon which the town is situated, he made a half right-hand turn, which brought him in the direction of the sea. When over the houses at the edge of the cliffs he made a sudden dive to earth at an angle of about 35°. He descended thus for about 550 ft., when the aeroplane must have attained a speed nearly approaching 200 miles per hour, he then attempted to suddenly flatten out the machine (with the intention probably of making another half right-hand turn and flying back to the Hangar), when under the extraordinary strain which the machine was subjected to, the fabric on the under side of the wings burst with the report of a gun, the pressure then got inside the wings, and suddenly they ripped them into little bits.

The body of the machine then dashed (minus wings) on the sands, the unfortunate pilot being hurled from his seat head foremost and falling about ten yards in front of the machine. Death was instantaneous, his neck being broken. Mr. Weiss, the unfortunate passenger, who was sitting in front of Mr. Oxley, had to be extricated from under the engine, and was so seriously injured that he died within an hour and a half. I am sure no blame whatsoever can be attached to the makers of the machine, as their machines are as strongly built as any on the market, my experience of construction being large and varied.

⊛ ⊛ ⊛ ⊛

AEROPLANES AND PARLIAMENT.

IN the House of Lords last week the Earl of Hardwicke asked the Government to make a statement of policy with regard to the training of the necessary mechanics, pilots, and military observers, and the provision and maintenance in war of sufficient air-craft with a view to removing the serious disadvantage which we at present suffer in this respect, and whether the Government proposed to give any practical encouragement to the manufacturers of this country with a view to enable them to supply the Government with British-built machines. His lordship pointed out in the question that there had been practical demonstration of the utility of aeroplanes in warfare in Tripoli, and in the French, German, and Roumanian manœuvres, and that France had already at her disposal between 200 or 300 war-planes and military pilots, while Germany had at least fifty qualified military aviators besides numerous others in training, and at least four military schools. So far as Great Britain was concerned, two of her aeroplanes might be relegated to Rotten Row, eight were serviceable for training purposes, but lacked speed, and were doubtful in regard to passing an adequate test, which left three aeroplanes only which were ready to take the field at any moment.

Viscount Haldane said that if there was any lack of progress in aviation it was not due to the Treasury, which had not stood in the way. But so far as the War Office was concerned, though he was always ready to spend money with the utmost freedom when he knew exactly how to get the best possible results, he would never, so long as he was responsible, lavish it in the hope that something might come of it. It was true that Great Britain was a good deal behind in this matter, but there were reasons for that. Nothing helped an aviation department like an enormous army, which had to operate over a field of more or less level ground. In France and Germany these conditions existed, and the air service had expanded to meet the needs of an enormous organisation. In this country the position was different. We required our air service for sea purposes. We had a small Army compared with Continental nations, and it was an army a large part of which had to go abroad a great distance.

That state of affairs reacted on the problem of the air service, and had a good deal to do with our position. The Government set to work two or three years ago to acquire the requisite scientific knowledge. That, to a great extent, they had now done, and they had discovered the whole field of air work to be still in a very undefined condition. Germany had apparently changed the type of her airship, and seemed to be turning from the airship to the aeroplane. It was by no means certain that an intermediate type of small airship would not prove to be of great value.

Foreign countries as well as Great Britain appeared to be working on that problem. It was a great mistake to suppose Continental countries had made up their minds definitely. They were making experiments on a huger scale than we, because they had armies on a much greater scale. But he doubted whether at this moment there was any country which could tell what the ultimate form of air-craft was to be.

The Government had at present twelve aeroplanes, and three more under construction at the present time. It was very difficult to say how many of these were suitable for war. The Government had been buying different types to see which was the best. Some of the craft were as good as could be bought. He would not be dogmatical on the point, but his information was that a larger number than three aeroplanes would be good for the fighting line. He could assure the noble lord that there was abundance of money—money to buy five times the number of aeroplanes we had at the present time. The question was which was the best type to buy, and that was by no means an easy question to determine. Aeroplanes changed almost from month to month at the present time. He agreed that, even with our small army, our air service was nothing like enough.

So far as airships were concerned we had one in active work, a second with which experiments are being made, a third which was practically constructed, and a fourth the materials of which were collected. They had a very efficient factory working on the best type of small dirigibles.

We had at present 171 men acquainted with the working of air appliances. Fourteen of these were officers, seven of whom were actually serving at the present time. Thirteen other officers had got pilots' certificates, and had asked to be employed with the battalion. Ten of these were in the Regular Army, two in the Special Reserve, while one was retired. We were moving slowly, but we were moving.

The important question was now being considered of working the Army establishment and aerial school along with the Navy. It was very desirable, in our case, with our comparatively small army, that this should be done.

Slowly as we were moving he would be very much puzzled to find means of going faster. Just as in the case of the motor-car, in regard to which this country now held as good a place as any other, so he had no doubt the practical British genius would evolve its own type of air-craft service, which would be suitable to the requirements of our small army and our great navy.

The Earl of Hardwicke said the noble lord's speech put this country on a plane with Roumania, which, indeed, was in a better position than we were. Aviation had come to stay, and it was going to be an adjunct of armies. He could not understand why the present apathy should still exist. Why not take a leaf out of the book of the French, and help the manufacturers. The Government had spent a considerable sum of money, and appeared to have little or nothing to show for it.

Viscount St. Aldwyn thought so slow progress had been made that Lord Hardwicke was well advised in calling attention to the matter. The speech of Viscount Haldane had not encouraged them to hope that the rate of advance would be more rapid. The Government were apparently waiting for some design which was perfection. He would only say that had never been the policy in the Navy. He remembered ships being built, over and over again, on designs which were considered reasonable, in order that the Fleet might have the best design at that time. It might be that millions had been wasted in this way, but it would never have done to be unprepared if the moment had come. He was afraid that if, in the present circumstances, we were to find ourselves at war we should be quite unprepared so far as this particular matter was concerned. He hoped the War Office would see to it that there was provision of the best at the moment.

⊛ ⊛ ⊛ ⊛

New Passenger Records.

ON the 8th inst., at Johannisthal, Suvelack, on an Etrich monoplane, beat the world's record for duration with a single passenger. He started off at half-past ten in the morning and kept going until a few minutes after three in the afternoon, when, according to the tentative official record, he had been in the air for 4 hrs. 33 mins., thus beating the duration record of Captain Gerrard made on a Short biplane.

At Kiewit, Belgium, on the same day, Lanser, on a biplane he had built himself, fitted with a 70-h.p. Gnome motor, and carrying three passengers, MM. Leroux, Marquet, and Pirrote, was up for 1h. 6m. 23⅘s., thus beating the world's record for that number of passengers made by Warchalowski, at the Wiener Neustadt aerodrome, of 45 mins. 46 secs.

On the 3rd inst., at Taliedo, near Milan, Deroye, on a biplane, with a passenger, Guidoni, beat the Italian passenger-record, by getting up to 1,280 metres. After this flight, which lasted 45 minutes, Deroye went up by himself to 2,800 metres.

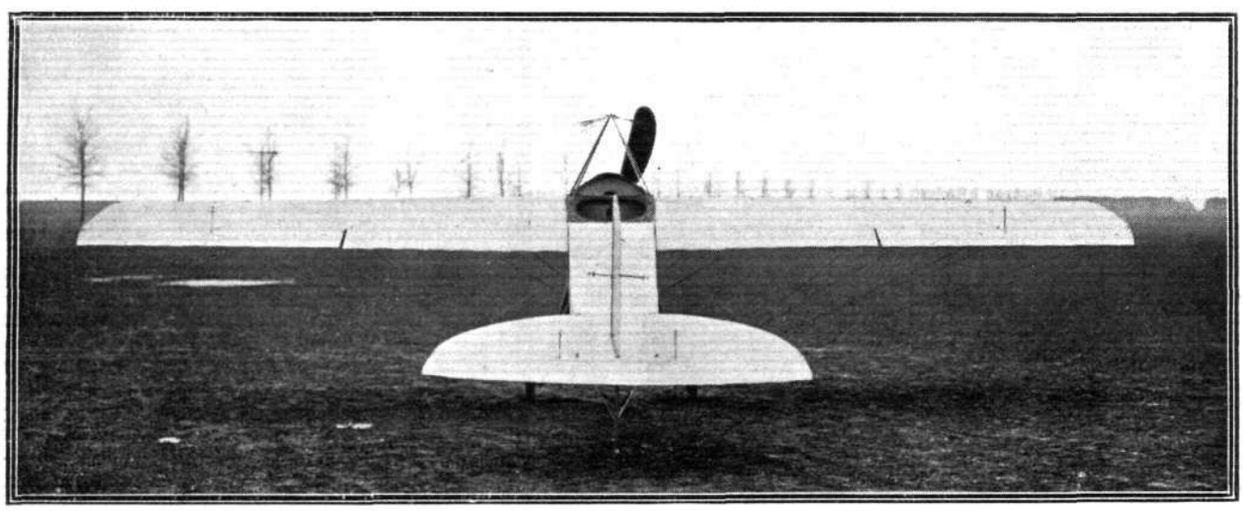
THE HENRY FARMAN TWO-SEATER MONOPLANE.

NOT content with his reputation as a constructor of biplanes, Henry Farman has, as our readers already know, self-imposed the task of proving himself an equally good constructor of monoplanes. In certain features his new monoplane maintains many of the same characteristics as his biplanes. In the matter of lateral balance, he still retains the use of *ailerons*, and the control lever is essentially the same as the later type of biplane lever, being situated between the knees of the pilot. The landing chassis has undergone slight modification, the characteristic two pairs of swivelling wheels being replaced by one pair of wheels, joined by a common axle, which

Three-quarter view from behind of the new Henry Farman two-seater monoplane, staged at the Paris Salon.

latter is flexibly sprung from the skids by the conventional elastic straps.

The main body is square in section, and is constructed on the usual box-girder principle. It is 25 ft. in length. At the forward end is fitted the engine—a Gnome of 50 h.p.—enclosed by a ventilated steel stamping in such a manner that it is impossible for any oil thrown off by the revolving motor to reach either pilot or passenger. At first sight one might think that this shield, almost enclosing the motor as it does, would have an adverse effect on the cooling.



View from behind of the Henry Farman monoplane.

Such, however, is not the case, for during the trials that the machine has undergone no tendency of the motor to overheat has been evident. The seats for both pilot and passenger are arranged so that no inconvenience is caused by the propeller draught, and are placed well forward in the *fuselage* so that they are afforded a good view of the country over which they happen to be passing. At the rear end of the main body are attached the organs which control the monoplane in the verticle and horizontal sense.

The wings, which subtend to each other a very slight dihedral angle, have a span of 33 ft. Their internal construction is very similar to that of the doubled-surfaced planes of the later type of Farman biplanes. As no provisions are made for warping, *ailerons* being employed, the wings are stayed rigidly from masts above and from chassis below by means of stranded steel cables.

Eight cables—four to each wing—support the wings when the machine is at rest, and twelve cables take the weight of the monoplane in flight. The trailing edge is allowed a certain degree of flexibility. Both *ailerons* are interconnected, so that a *downward* deflection of one is accompanied by an equal and *upward* deflection of the other. A certain advantage of using flaps for balancing in this manner is the fact that the wings are kept rigid, and are not subject to continual deformation, as is the case when warping is used as a means of securing lateral balance.

The tail of approximately semi-circular planiform is flat, and takes no weight in flight. To the rear edge of this surface is hinged the flap, which controls the ascent and descent of the machine.

Steering to right and to left is effected by a vertical rudder, which is mounted just in advance of the elevator. When the machine is at rest the weight of the tail is taken by a short skid, which is flexibly attached to the main-body skeleton, and which is allowed to swing to right or left, in order to accommodate any sideway's movement on landing.

The landing chassis, a wheel and skid combination, needs little or no description, as a good idea of its main features can readily be gathered from the photographs appearing herewith.

Ready equipped for flight, but without pilot or passengers, the machine weighs 627 lbs., and in addition to this it can raise a useful load of 400 lbs. Its speed is from 62 to 68 miles per hour.

FLIGHT

THE MILITARY AEROPLANE.

THE AERONAUTICAL SOCIETY'S DISCUSSION.

So successful was the discussion organised by the Aeronautical Society at the Royal United Service Institution on Wednesday, December 6th, that arrangements have been made to resume the subject next Monday, December 18th, when Maj.-Gen. R. M. Ruck, C.B., will again preside.

Col. Capper opened the discussion, and thereafter officers and designers were called upon alternately to speak upon the points raised. Col. Capper's remarks are given in full herewith, together with a summary of the essential points raised by other speakers. At the forthcoming discussion on Monday an analysis of these points will be used as a basis for the proceedings and references will be strictly limited to the ground thus outlined, in order that definite conclusions of a useful character may be evolved. By permission, an officer of the General Staff will give a short lecture, illustrated by diagrams and maps, stating what is considered at the present time to be the best method of using a military aeroplane for scouting purposes in time of war.

H.S.H. Prince Louis of Battenberg. and Col. Seely, Under-Secretary of State for War, have accepted an invitation to be present, as also have Lieut.-General Sir Arthur Paget and many distinguished officers of the Military Service. As will be seen from the analysis given below, there are many points on which officers, designers, and pilots may hold conflicting views, and it is the object of this meeting to so reconcile them as to leave the constructor in no doubt as to what the army regards as essential, while it informs the military side of those desiderata that must be sacrificed for the sake of more efficient service in other ways.

Pilots, civil and military, manufacturers and designers, and officers of the army and navy will, therefore be particularly welcome at the next discussion, and those who have not yet joined the Aeronautical Society should write to the Secretary at 53, Victoria Street, S.W., for an invitation. Lack of time will prevent long speeches, but those in a position to make known matters of fact or experience relative to any of the points mentioned below, should send in their names without delay. The meeting will take place on December 18th, at the Royal United Service Institution, in Whitehall, and will commence at 8.30 p.m.

COL. J. E. CAPPER, R.E. :—

I feel that it is a great honour that I should have been asked to open the discussion at the first of a series of meetings of the Aeronautical Society, which we all hope may prove to be of great value to the science of aeronautics we all love so well.

In opening the discussion, I do not propose to go at all into technicalities, nor to treat the question from the point of view of the Military Aviator, a title to which I have no claim. Others here will be able to say what they want in this respect. I think it would be best to discuss at this first meeting our requirements, leaving it to other meetings to discuss in what way each quality of the machine may best be provided, and thus progress from point to point. Nor do I pretend in any way to formulate the reasoned demands of military commanders as regards these machines, although it is possible that others here may be able to do so ; in any case we have been promised shortly a specification on which the construction of military machines should be based. I can only pretend to give an individual opinion as to what I would personally ask of an aeroplane, if I were commanding a force, as being an officer who is not entirely ignorant of the subject, and knowing roughly what at the present moment is possible, and in what direction we might expect improvements in the early future.

At present, I would only look to my aeroplanes to give me information by reconnaissance. At the same time I would require them to be armed with some light form of shooting weapon, as it may not prove unlikely that they may be required to fight an enemy's aeroplane, either to secure information themselves or to prevent him obtaining any. The first point required of any means of securing military information in war is that you should be able to make use of it on as many occasions as possible.

The second point is that the machine, being capable of proceeding to considerable distances, should be able to return *rapidly* to some definite point with the information obtained. In fact, this is co-equal in importance with the first point, as information obtained by an individual and not rapidly communicated to those who can make use of it is, in general, of very little utility in war. The third point is that, in order to increase the chances of both obtaining and communicating intelligence, the machine should be as immune as possible from destruction by the enemy.

These are the three cardinal points to be borne in mind in selecting a military machine. All others are, to my mind, of secondary importance. Some people will, apparently, accept as suitable nothing but a regular "Admirable Crichton" of an aeroplane ; I do not think we have as yet any hope of obtaining such a machine, but we can obtain results of the utmost military importance from one that is at the present moment a practical proposition.

Taking my point of view, it is, therefore, comparatively easy to state the main points that must be sought after in designing a good military aeroplane, one, that is, with the present experience of designers, constructors, and aviators, perfectly capable of being constructed within the next six months.

There are certain axioms of the matter that need only to be alluded to, *e.g.*, that the machine must be capable of flight, that it must carry someone who can make and record observations, that it must be possible to see from it, etc., but these are so obvious that I only mention them for fear it should be said that I had not taken the most elementary necessities into consideration. I will now proceed to state what conditions must be fulfilled to enable us to meet the three cardinal desiderata of the military machine.

First, to enable us to make use of it as often as possible, a machine must be capable of rising from ordinary grass fields (I would not say long hay or grass), from light ploughed land, desert, &c., *i.e.*, ordinary open land such as is generally to be met with in the neighbourhood of large operating forces, and of landing on the same. It must be able to fly in winds of considerable force and variability, so as not to be too dependent on the weather. It should be easy to learn and manipulate, as it is improbable that any large number of officers will be in constant practice ; the strain on the one specially skilled may be very great, and casualties will occur amongst them. As it is exceedingly desirable that no very high standard of skill should be required to manage a military aeroplane, natural stability will be a great asset. It should be strongly built to stand rough usage and exposure to bad weather and to not require constant delicate adjustment of its parts. Finally, the engine in it should be simple and reliable, capable of being kept in good order by men of average mechanical skill.

To return *quickly* with information, entails speed both to shorten the time between obtaining and communicating the news and to enable hostile aeroplanes to be eluded. The business of a scouting aeroplane is not to fight without absolute necessity. When it has obtained news it is never justified in risking the loss of its news in a fight and it should be speedy enough to get home without fighting. Speed, moreover, will act as a great guard against damage from weapons shooting from *terra firma*. Power to land at any spot however rough, is not of the first importance. Messages can be written and dropped with sufficient accuracy near desired spots and with a proper system of selecting landing places and arranging motor or other quick transport there should be no great delay in getting a reconnoitring officer to headquarters, should a personal interview be necessary.

The third point, immunity from destruction by the enemy, would appear to entail ability to rise quickly to considerable heights where ordinary artillery fire need not be feared and where rifle fire may prove negligible. Also some protection of the vital parts by light armour, in order that a single chance bullet should neither stop the engine nor incapacitate the pilot. A duplication of controls would also seem to be necessitated. The enemy's aeroplanes must also be considered. Charging will not, in all likelihood, be attempted except to gain great ends, owing to its leading to the destruction of both sides, but it is not improbable that attempts to destroy may be made by rifles or pistols, by giving one's "wash" to the enemy, or perhaps by some form of ignition or destructive bombs.

Power to manœuvre quickly, both in vertical and horizontal planes, will be very desirable, conferring a great advantage on the handier machine. Stability, both to withstand backwash and that the machine may be used as a firing platform, will undoubtedly be of use, whilst a clear field to the front would be a matter of importance and would appear to give an advantage to those machines fitted with propellers over those with tractors.

I hope that in giving this short outline of those points I consider to be of supreme importance I have not laid down anything beyond the scope of our present designers, but I quite realise that a machine built to fulfil these conditions will entail the best efforts of all those who are interested in the evolution of the aeroplane, and I hope that what I have said may be a basis for a very interesting and practical discussion.

CAPT. WOOD (VICKERS, LTD.) :—

The principal requirements for tactical reconnaissance, it seems to me, are the following :—

Firstly, that the observer can obtain a good view of the country over which he is passing and that he shall see comfortably without having oil in his eyes or excessive wind in his face. Without going into the question of biplane *versus* monoplane, there is no doubt that the former is easiest to see from, and it seems to me that in most of the modern monoplanes, where everything has been sacrificed

to cutting down head resistance, the view that can be obtained has been somewhat overlooked.

Secondly, since a military machine will often have to descend on unfavourable ground, the landing chassis should be strong enough to stand some heavy landings without damage. Most of the accidents sustained by experienced flyers can be attributed to the undercarriage giving way in a rough landing, and while these accidents cannot be altogether obviated, the average landing carriage seems to have been constructed more with a view to a perfect landing on favourable ground than to sustain the rough bumps that may be inevitable on service.

May I at this moment put in a word for steel construction. The conditions of service, as all soldiers know, are rough in the extreme, and it seems likely that many of the most popular wooden machines would not for long stand the necessary wear and tear of camp life. A bent steel tube is easily mended with a sleeve, and the result to the machine of a tube buckling is probably not as grave as a stanchion breaking.

Thirdly, a silent motor is required, or, at any rate, a motor as silent as possible. This seems to exclude the rotary type engine, as it is practically impossible to silence it. The great objections, of course, to fitting silencers are the loss of power and extra weight which they involve, but I think it is a question which may be closely gone into.

CAPT. BROKE-SMITH, R.E.:—

A most desirable qualification for a military machine is portability. It should be capable of being folded up and transported by road, towed behind a motor car or lurry. Special wheels and fittings for long-distance road travelling might be provided, which would be fixed when required and removed for flying.

Interchangeability of parts is a special desideratum to facilitate replacements and repairs, and to enable stock of spares in the field to be small.

Standardisation of fittings, improvement and refinement of details is desirable, but should not tend too much in the direction of specialising fittings of such a nature that makeshift repairs would not be possible on some occasions with any materials at hand in emergency.

Machines easy to learn are not always at present the most efficient flyers. Developments are desired in the direction of producing machines which are not very difficult to fly, but which have at the same time a maximum of efficiency.

It is desirable that machines should be able to land on quite bad ground. Although good landing places may be selected beforehand, or messages may be dropped without descending, nevertheless circumstances may compel a military aeroplane to land on very bad ground, such as a ploughed field.

Flexibility of speed is desirable in order that sufficient speed may be developed to combat strong winds and that, at the same time, a machine may be able to land in a comparatively enclosed space, for which purpose a slow speed is an advantage. Slackening of speed to enable detailed observations of troops to be made when in the air may be desirable, although an opinion exists that from considerable altitudes high speed alone does not preclude detailed observations from being made.

In regard to radius of action one is not competent to say at this stage what the most suitable radius of action for a military aeroplane in all cases may be in the future, when more experience has been gained in its exact military use, but it may be taken that a useful normal military radius of action of 60 miles is to be expected at present. (*Note.*—This implies a capability of travelling any distance up to 200 miles or more without a stop.)

For general military purposes a machine to carry two, a pilot and an observer, will be most useful. Single-seaters may be employed for special purposes, *e.g.*, observation of artillery fire, when ascents are made for short periods, &c., but a two-seater machine with one man on board can, in many cases, do the work. (*Note.*—This does not imply that all military machines must necessarily be of one type; they may be organised into sections, each containing a group of machines of one pattern, designed and equipped for a special purpose.)

Dual control is very desirable, to enable one man to take on the control if the other becomes fatigued or is wounded. Observers would probably have sufficient knowledge of flying to be able to take over the control in case of necessity.

In respect to speed of ascent many considerations apply, and figures are open to argument, but to ask for a machine that can rise from the ground fully loaded, 1,000 ft., at the rate of, say, at least 200 ft. per minute, is, it is thought, reasonable.

A military machine should be able to attain, and keep for a period, a height of 4,500 ft. when fully loaded.

In connection with a view from machine, the distribution of large bodies of troops (*e.g.*, transport trains, &c.) can be observed to a distance of 2 miles from a point immediately under the observer from a good working altitude of 2,500 to 3,000 ft. The field of view of the observer should, therefore, at least enable him to see a radius of 2 miles to the front and sides from this height.

The efficiency with which reports can be brought back direct, owing to the high speed of the modern aeroplane, and the inherent difficulty of operating a telegraph instrument under such difficult conditions, signalling by the Morse code (sending and receiving), appear to render it inadvisable to give much attention to the employment of wireless telegraphy for conveying information from a military aeroplane at the present moment, especially as the method is at such a very early stage. Developments in the perfection of wireless should, however, be watched. (*Note.*—Wireless will be of more value in the future, when the range of an aeroplane has increased, and when considerable time would be saved by signalling messages direct.)

MR. S. F. CODY:—

Silence is, in my opinion, the first point of importance in an aeroplane that naturally flies well and is sufficiently fast. An aeroplane is worthless if it is not silent.

The machine should rise 1,000 ft. in less than four minutes.

The military aeroplane should carry half-a-ton of useful load in addition to its own weight.

It should be capable of landing on the worst sort of ground without breaking itself.

The radius of a military aeroplane should not be less than two or three hundred miles.

Facilities for road transport are not very important, and if a machine is constructed with this too much in view it is detrimental to efficiency.

Simplicity in the repair of a machine is essential.

A speed of not less than 60 m.p.h. should be insisted upon.

COL. RAWSON:—

Three cases that actually occurred in the South African war may serve as illustrations of various points raised this evening.

A commanding officer wished to send 40 lbs. of dynamite 78 miles, which was done by a mounted man with a lead horse and occupied 36 hours there and back.

On another occasion I desired information of 600 Boers reported 75 miles distant. It took half a squadron of cavalry a considerable time to bring the information that there were no Boers at all.

General Buller particularly wanted to know at once that information had reached its destination, which was 90 odd miles away; the journey by horse involved great delay.

These are typical examples in which the aeroplane could have rendered invaluable service in war. We want an aeroplane that will distribute reserve ammunition over a frontage of seven to ten miles.

A travelling repair waggon will be a necessary adjunct to the aeroplane service and deserves attention.

CAPT. BURKE:—

Comparative invisibility in form and colour is an important source of protection for a military aeroplane that should not be ignored.

From the data provided by the French Trials it may be said that we have a useful range of speed from about 40 to 72 m.p.h., which the military officer must turn to the greatest advantage.

Machines for military use divide themselves into three types. The first type is a high-speed reconnoitring aeroplane capable of flying very fast indeed and of covering 250 miles without descent. It should be capable of rising to an altitude of 3,500 ft. and of being easily flown at night.

The second type is a machine for observing or fighting as the case may be, and is intended for greater detail work than the smaller type. It must have two seats in order to accommodate a reconnaissance officer, as the pilot would be unable to make the necessary notes. Very high speed is not essential, and an altitude of 3,000 ft. is sufficient.

The third type is a three-seated machine to accommodate a relief pilot, so that it may remain aloft during grand tactics for long periods without descent.

J. W. DUNNE:—

The main essential of a military aeroplane disclosed by the discussion is the necessity of being able to use it when it is wanted, and not only when the weather suits. To be of any use at all to the general in command he must be sure of being able to employ it four or five days a week. The corresponding attribute of the machine that meets these requirements is, of course, a high degree of natural stability.

The next point seems to be the necessity of being able to rise from bad ground.

It is not the slightest good being able to go when, whence, and

where you want unless you can return. Far more important than the third passenger, than the second passenger, than armour, than wireless telegraphy, is a second engine that will allow you to return if the first breaks down.

The question of whether you are going to fight on an aeroplane depends on whether you are more anxious to return yourself or to prevent the enemy that is over your lines from returning in his direction. It seems to me the aeroplane will often fight, and as it is a question that affects the designer very closely, the military users ought to come to a decision on the point.

If you have a propeller in front of you you cannot use a rifle in that direction.

To argue that a cavalry patrol does not fight seems to me to be no argument that the aeroplane patrol will not fight in actual warfare. The cavalry patrol has behind it the main body of cavalry, and the reason why the cavalry patrol cannot do any serious harm by fighting is because the enemy's main body of cavalry must always intercept its advance. In the air the circumstances are different; there is no main body of aeroplanes, and the advantage of breaking through the lines may prove well worth while any day. In my opinion the aeroplane will certainly fight and must be built to do so.

COL. F. G. STONE :—

Our chairman has informed us that Col. Seely has admitted that more than one type of aeroplane would be required for the army, and Capt. Burke has given very good reasons for the adoption of three types. Personally, I am in favour of two types, which, in the interests of simplicity, is preferable to having three, provided that the work required of them can be efficiently performed.

We require a one-man machine of the highest potentiality in respect to manœuvring power, in which is included speed, rapidity of ascent and descent, and power to turn sharply; in order to obtain full value from such a machine we require the maximum of skill in the pilot. Such a machine would be suitable for undertaking general reconnaissance prior to an engagement on the lines proposed by Capt. Burke. But it would also fulfil an essential function as a fighting machine in attacking an enemy's aeroplanes or airships, preventing them from gaining information, or from attacking our reconnoitring aeroplanes during an engagement.

My view is that the attack of hostile aeroplanes will preferably be confided to machines of the class suggested rather than to slower but more heavily armed vessels; the sort of aeroplane I advocate for this purpose corresponds more to the torpedo boat than to the armoured cruiser; it will rely on its power to outpace and outmanœuvre its enemy, to get above him and disable him by its wash or by a hand genade thrown on to him in passing. The pilot for such a machine must be a picked officer, who combines the highest degree of skill *qua* pilot with considerable aptitude for and experience in reconnaissance work.

We shall require a two-man machine for what I may call battle reconnaissance, or tactical reconnaissance; the stability and endurance of the machine in this case are of greater importance than a high degree of potentiality for manœuvring purposes. The pilot must be capable of taking out his machine in bad weather, and the observer or reconnoitring officer must be the best man who can be obtained for the job; preferably an officer of the General Staff, with considerable experience of manœuvres and active service, and he must be trained by practice to the highest possible degree of excellence.

It is scarcely practicable to combine the diverse qualities required of a first-rate pilot and a first-rate reconnaissance officer in one and the same man; to attempt this would be at once to narrow the field of selection most prejudicially. But the first-class professional pilot should be a good amateur reconnaissance officer, and the first-class professional reconnaissance officer should be a good amateur pilot; such a combination will enable us to get the maximum value out of every machine employed.

I make an appeal to designers to give us a practical aeroplane target for the artillery to shoot at. We want something in the shape of an automatic aeroplane, which we can start over a safe land or sea range, to give us a run of a couple of minutes during which it can be fired at, and then to come down of its own accord before it gets outside the limits of the land or sea area over which it can be used without danger to life or property. If we have no suitable target to practice at in peace time, you cannot expect us to hit anything in war.

MR. ARCHIBALD LOW :—

There exist certain relations between the ultimate strength of materials and the best size of an aeroplane capable of carrying a pilot of a given weight (see Soreau "Etat actuel de l'aviation," p. 120, and see "Les lois experimentales de l'aviation," p. 169,

Without troubling the Society with technicalities, it may be stated roundly that an 8-stone pilot equipped with a 32-h.p. motor and a 14-stone pilot equipped with a 56-h.p. motor are so far from being on equal terms that the lighter pilot has a much greater proportional energy reserve than the heavier pilot. This indicates that the War Office limit of 10 stone for a pilot is sound.

Conceivably an aeroplane equipped with a 50-h.p. motor, without fuel or pilot, might be built within 500 lb. weight, but it would not stand knocking about in rough weather, and if the requirements put forward by military officers are allowed, each one adds to this basic weight somewhat as follows :—

A motor that any amateur can run ...	say	200 lb.
A light gun and ammunition ...	,,	50 ,,
Armour, anything up to		1,000 ,,
Extra large wheels	say	50 ,,
An extra passenger	,,	140 ,,

In this way the aeroplane is actually required to raise several thousand pounds' weight, and, unless very great care is exercised, may even violate Col. Capper's elementary principle that a military aeroplane "should be able to fly," which the audience scarcely accepted with gravity becoming to the subsequent developments.

Even in ordinary daily life the designer has to be prepared to add many insignificant extras that add surprisingly to the total load. For instance, compass and fittings, 10 lb.; inclinometer, 3 lb.; speedometer, 7 lb.; dual control, 20 lb.; dashboard, 10 lb.; map and case, 3 lb.; searchlight, 50 lb.; extra gauges, 20 lb.; aneroid, 2 lb.; safety belt, 5 lb.; total, 130 lb.

Thus is it very easy to eliminate from an otherwise successful machine the capacity of carrying an extra passenger. Nor do these minor details include such important articles as a wireless telegraphy outfit and floats for the purpose of landing on water, which will easily add the weight of yet a third passenger to the dead load supported, so that some machines designed on a bare margin would be unable to carry the pilot himself by the time they were loaded up with these unconsidered extras.

First and last, therefore, it is essential to know everything that is really necessary before it is possible to evolve the best design.

Analysis of the Discussion on the Military Aeroplane (with some questions that are still unanswered).

Two types of machine are essential.
- A. The scout, in which speed is everything.
- B. The destroyer, in which fighting is the predominant factor.

Queries *re* Types.

A type.—Is the pilot alone on a modern high-speed aeroplane sufficiently reliable for reconnaissance, or must the machine be constructed to carry a reconnaissance officer as passenger?

How much speed will be lost by carrying the passenger?

Can the control of the machine be improved to give the pilot sufficient facility for adequate reconnaissance, and if so can the maximum speed be retained?

B type.—Should provision be made for one fighter or two, *i.e.*, should the machine be two-seated or three-seated?

If three-seated, must it be capable of being successfully operated by two only?

Essential qualities in any military type of aeroplane.

Ability to fly in any ordinary weather.

Adequate range of vision for reconnaissance.

Simple engine and simple machine, both easy to repair and adjust.

Standardisation of the principal parts.

Standardisation of the principle of control.

Unnecessary at Present. Wireless.

Essential Qualities in the "A" Type Aeroplane (with queries that remain unanswered).

The maximum possible speed available in the current state of the art, at present not less than — m.p.h.

Comparative silence.

A radius of action of 100 miles (*i.e.*, ability to make a 200-mile flight without descent).

Essential Qualities in the "B" Type Aeroplane (with queries that remain unanswered).

High efficiency of weight-carrying-hours-per-pound-of-fuel in order to give the greatest reserve of lift for carrying ammunition or fuel.

A very strong landing chassis, in order that the machine may not easily be placed *hors de combat* by descending for supplies within its own camp.

Great steadiness and easy manœuvrability in the air, in order that the shooting may be effective.

? Speed in the order of — m.p.h.

? Minimum duration of flight, — hours.

? Nett lift sufficient to carry — lbs. of ammunition.

? Unhampered vision and firing range over — degrees. The propeller must not be in front.

Desirable Qualities in the "A" Type Aeroplane—

Invisibility.

Desirable Qualities in the "B" Type Aeroplane—

Dual control. Facilities for road transport.

Light armour on vital parts.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Committee Meeting, December 6th, 1911.

New Members.—The following new members were elected :—Amyas Eden Borton and Frederick Handley Page.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

165. Maj. R. L. Benwell, I.A. (Bristol, Brooklands).
166. Capt. Robert Gordon, R.M. (Bristol, Brooklands).

Royal Aero Club Special Certificates.—The following Special Certificates were granted :—

1. S. F. Cody (Cody biplane). Cross-country course : Laffan's Plain to Shrewton, Wilts, and back.
2. James Valentine (Bristol monoplane). Cross-country course : Salisbury to Laffan's Plain and back.
3. Capt. J. D. B. Fulton, R.F.A. (Bristol biplane). Cross-country course, Salisbury to Laffan's Plain and back.

F.A.I. Conference.—*Aviators' Certificates.*—At the Conference held in Rome last month the question of reducing the age limit for aviators' certificates was considered, and it was decided to make no alteration in the existing rules, which stipulate that the candidate must be at least 18 years of age.

Gordon-Bennett Aviation Cup.—The cup having been won by America, the race next year will take place in the United States. The course is to be a closed circuit, with a minimum of 5 kilometres, and the total distance to be flown is 200 kilometres. It was unanimously decided that hydroplanes should be admitted to the contest.

The proposition of the Royal Aero Club for a cross-country course was not agreed to.

Law Committee.—It was decided to establish a Law Committee of the Federation. On this Committee two representatives—one of them a lawyer and the other an aviator—will be appointed by each of the clubs belonging to the Federation. The exact scope of the Committee's activities is to be decided upon at its first meeting, which will be held in Brussels early in the New Year. A unanimous vote of thanks was passed to the Chairman (Mr. Roger W. Wallace, K.C.) and Capt. Bertram Dickson, who attended the Rome Conference on behalf of the Royal Aero Club.

Aeronautical Bodies.—Letter from the Aerial League of the British Empire withdrawing from the tripartite agreement of May 3rd, 1909, was read and noted.

This agreement was drawn up in May, 1909, defining the spheres of action of the three aeronautical bodies, viz. :—the Aeronautical Society, the Aerial League of the British Empire, and the Royal Aero Club.

Deputation to the Under-Secretary of State for War.—Sir Charles Rose reported the deputation to the Under-Secretary for War at the House of Commons on the 5th inst. A unanimous vote of thanks was passed to Sir Charles Rose for the kind services he rendered to the Manufacturers' Committee and for introducing the deputation to Col. Seely.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 12th inst., when there were present :—Mr. R. W. Wallace, K.C., in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Capt. Bertram Dickson, Prof. A. K. Huntington, Mr. F. K. McClean, Mr. J. T. C. Moore-Brabazon, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, Mr. C. F. Pollock, and Harold E. Perrin, Secretary.

New Members.—The following new members were elected :—Edward Richard Adams, Francis Evelyn Bray, Henry Franklyn Browne, Major F. M. Carleton, Miss Eleanor Josephine Trehawke Davies, and George Ambrose Lloyd, M.P.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

167. J. D. P. Chataway (Deperdussin monoplane, Brooklands).
168. C. F. M. Chambers (Valkyrie monoplane, Hendon).

⊛ ⊛

Damage to Fields by Crowds.

AT the annual general meeting of the Central Chamber of Agriculture it was reported that the Council had had under consideration the question of possible damage to crops caused by crowds drawn together by aeroplane accidents. Farmers and market gardeners had their remedy for damage caused by the aeroplane itself or the aviator, but it was not yet clear whether they could establish a claim against anyone for damage caused by a crowd collectively. It was suggested that the Parliamentary Committee should consider the matter to see whether anything could be done.

Royal Aero Club Special Certificate.

(*Under the rules of the Fédération Aéronautique Internationale.*)

The rules were amended as follows :—

The Royal Aero Club of the United Kingdom will grant a Special Certificate to aviators who hold the F.A.I. Aviators' Certificate, and who are entered on the Competitors' Register of the Royal Aero Club, and fulfil the following requirements :—

(*a*) An altitude flight of at least 1,000 feet rise, which shall be verified by recording barograph, sealed by the observers prior to the start.

(*b*) A glide from a height of at least 500 feet above the ground to earth, with engine completely cut off. The landing must be made under normal conditions within 100 yards from the starting point. This glide may, at the candidate's option, be the conclusion of Test 1. Tests 1 and 2 must be accomplished before Test 3 is attempted.

(*c*) A cross-country flight, out and back round a point situated at least 50 miles from the start. The turning point will be selected by the Royal Aero Club, and will not be indicated to the candidate until one hour before the starting time selected by the candidate. This flight shall be completed within five hours of the selected starting time. No passenger may be carried during this flight.

1. A sealed barograph must be carried in all flights.
2. Each of the flights must be vouched for in writing by observers appointed by the Royal Aero Club. All tests to be under the control of, and in places agreed to by, the Royal Aero Club.
3. All flights must be made between sunrise and one hour after sunset, and suitable previous notice must be given to the Secretary of the Royal Aero Club.
4. Candidates must make application on a form provided for that purpose. Any expenses incurred must be borne by the candidates.
5. The Royal Aero Club will decide if the candidate has qualified for a certificate, but reserves the right to grant, refuse or withdraw the same at any time without giving reasons.
6. The decision of the Royal Aero Club on all matters connected with the tests is final and without appeal.
7. The Royal Aero Club reserves itself the right to interpret, add to, amend or omit any of these rules, should it think fit.
8. The Royal Aero Club declines all responsibility for any accidents, or any damage that may occur to the aviators, their machines or to any third parties during or in connection with the qualifying tests of the candidate.

"Daily Mail" Second £10,000 Prize.

The Committee of the Royal Aero Club is making a further and final distribution of £12 10*s.* to each competitor in the above competition, and the cheques will be drawn on the 19th inst.

It was previously announced that the Committee would return to competitors any balance of the entry fees in hand, after payment of the expenses. A sum of £40 each has already been refunded, and this final payment will make a total distribution of £52 10*s.* to each competitor.

Late Hon. C. S. Rolls and Cecil S. Grace.

Col. Charles K. Brooke has kindly contributed the sum of £1 1*s.* towards the stained-glass window now being erected at Eastchurch in memory of the late Hon. C. S. Rolls and Mr. Cecil S. Grace.

HAROLD E. PERRIN,
Secretary.

166, Piccadilly.

⊛ ⊛

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Flying Ground, Eastchurch.

STRONG south-westerly gales prevailed for the greater part of last week at Eastchurch, and prevented very much flying being done. On Wednesday there was an improvement, and Mr. V. A. Barrington Kennett (of the London Territorial Balloon Corps) made his first solo flight on the 70-h.p. Short biplane. After making several short straight flights he took the machine up to about 70 ft., and at that height put in a complete circuit of the ground, making his first turn in a very neat manner, and finishing with only the slightest of "pancakes" quite close to some trees on the outskirts of the ground. No further practice was possible until Saturday, when Mr. Alec Ogilvie, on his N.E.C.-engined Wright, and Mr. Frank McClean, on the Short twin-engine machine, were both out flying in a very strong wind, Mr. McClean carrying several passengers during the afternoon. At one time Ogilvie, who had risen to a height of some 600 ft., appeared from the ground to be quite stationary, having apparently struck a very rapid current of air from the south-west.

Some excellent flying was witnessed on Tuesday. Lieut. Samson was out first on the Short twin-engine machine, and made a long flight in a wind of considerable force. Although the wind currents were somewhat gusty Lieut. Samson found the machine extremely steady in the air. In the afternoon the wind abated greatly, and by 4 p.m. a dead calm prevailed. At this time Lieut. Longmore, who was out on the Blériot, made an excellent flight of about 15 minutes duration, finishing with a very neat landing close to the sheds.

The Short twin-engine machine was also out again, this time piloted by Captain Gerrard, with Lieut. Gregory as a passenger. The two officers made a long flight during which they passed over Sheerness harbour, and recognised many of the warships at anchor there. For the greater part of the flight Captain Gerrard kept the machine at an altitude of nine hundred feet without any appreciable variation, this height being checked by two aneroids, both of which read alike.

Brighton-Shoreham Aerodrome.

ON Wednesday, last week, Lieut. J. C. Porte gave a masterly demonstration on the passenger Deperdussin, after which Mr. Charteris had the pleasure of joining him for several turns round the aerodrome.

In the Chanter school, De Villiers and Gassler were doing straight flights on Tuesday, and Wednesday saw Gassler putting in further similar practice.

There has been some delay in connection with the engine for the Collyer-England biplane, but this machine should soon be on the wing again.

Brooklands Aerodrome.

KEMP, on Wednesday last week, was out first on the Vickers, and put in two or three circuits, but owing to one cylinder missing was obliged to come down *en vol plané* from 800 feet. Chataway, on the Deperdussin, went in for the first half of his ticket early, and the second half later, passing in quite good style. The Walton-Edwards machine was flying in still better form, managing to execute a half-circle round the sewage farm. Spencer and Raynham were also out doing circuits and taking passengers. The latter contrived to do this by removing the large petrol tank from the Viale-Avro, and making the passenger kneel facing him. Scarcely the most comfortable position for a long cross-country flight, but quite effective, and one which caused some amusement. Gilmour was out on the Martin-Handasyde, circling the ground at a good altitude. Sabelli took a short trip on the Deperdussin, which, after he had relinquished it, Wilkins succeeded in completely disintegrating on the river bank. Pulling it up off the ground rather too steeply for a machine of that power, he made a straight flight across the grass in a somewhat *cabré* position. Accounts vary as to the exact cause of the smash, but Wilkins himself thinks it was due to a *remous*. The machine fell only a yard or so from the stream, the pilot himself fortunately escaping without a scratch.

Later, both Spencer and Lieut. Snowden Smith were in the air, the latter, as usual, on his Hewlett-Blondeau racing Farman.

On Thursday the weather was too bad for any flying, as was also Friday, with the exception of a short period late in the afternoon, which Gilmour took advantage of by putting in several circuits on the Martin-Handasyde, while Raynham was up on the Avro.

Saturday, too, was by no means an ideal day for flying, but the Avro, Bristol, Walton-Edwards, Spencer, and the Martin-Handasyde were all at work. The last-named was piloted as usual by Gilmour, who indulged in some "stunts" to amuse the crowd. This he did by banking at forty-five degrees, switchbacking, and diving. Raynham first took out the Avro, then Sippe, who did one circuit in very good style, landing faultlessly.

On account of the terrific wind and rain, Sunday was too bad for any flying, Monday being fairly unpleasant also as regards wind. The Walton-Edwards and the Avro, however, were out for engine-testing purposes, but did not leave the ground.

On Tuesday morning Raynham was out first, as usual, on the Viale-Avro, taking it outside the track over Chertsey, followed by Sippe, who accomplished several circuits and figures of eight. Later in the morning the Walton-Edwards did straight lines up and down the ground. The Humphreys monoplane, which has spent a long period in its shed being repaired, once more made a reappearance. After a preliminary test of the 60-h.p. Green engine had been made, the machine was taken out by Gordon Bell. Running down the ground on obviously less than half-throttle, the pilot and spectators were intensely surprised to see the machine rise from the earth and climb. Bell tried to bring her down again, but was unable to in the ordinary way, as the control was at the limit of its forward movement; so, on switching off the engine, the machine gently "pancaked" without any damage. Hunter then bravely volunteered to go as a passenger in order to bring the nose down somewhat, and took his seat accordingly, but without causing the desired effect, as the machine still insisted on rising when running at apparently well under 20 m.p.h. When Garne also offered and was taken, together with Hunter, the machine still behaved in the same way, with the engine throttled down. This speaks well for the "beef" developed by the Green, and when the latter has been tuned up an attack on the existing three-passenger monoplane records is to be attempted.

Grahame Gilmour in the New Martin-Handasyde monoplane. In the background is the Walton-Edwards biplane, in its latest form at the Brooklands aerodrome. This very substantial machine is now carrying out flights on the grounds.

In the afternoon the Viale-Avro was again out, piloted by Raynham, who flew circuits at frequent intervals. At the Deperdussin school, Sabelli was up on the 35-h.p. machine, and later a new pupil on the school 'bus, rolling. Gordon Bell, provided with an altimeter, took out the Martin-Handasyde, with injunctions to let her climb as much as possible without forcing her up. The machine flew beautifully, and quickly rose to a very high altitude. On his returning to *terra firma*, it was found that Bell had omitted to take the time, being under the impression that it was to have been taken for him, so no data was obtained beyond the fact that 3,000 ft. was reached in a remarkably short period. At dusk Sippe took out the Viale-Avro once more, flying two circuits, while the Pashley Brothers were engine-testing on the Humber-Blériot.

London Aerodrome, Collindale Avenue, Hendon.

Blériot School.—On Monday last week all the pupils were out practising. Messrs. Allen, Dessouter, Prensiell and Sacchi making great progress, and executing circular flights. Mr. Briere is also showing considerable skill.

On Tuesday the same pupils continued their steady practice, whilst on Wednesday Messrs. Prensiell, Dessouter, Sacchi and Welburn were working practically all day.

During the end of the week the weather was too bad for the pupils.

Valkyrie School.—On Wednesday of last week there was a dense fog all the morning; however, it cleared off a little at 2.30 p.m., when Ridley-Prentice took out the Green-engined Valkyrie. He flew a few circuits, with very sharp turns and splendid banking, eventually landing in front of the hangars with a well-judged glide. Chambers immediately mounted the same machine, and flew numerous circuits in spite of a gusty breeze. He was flying exceedingly well, but it was still too foggy to allow him to make his second test flight for his *brevet*. Later in the afternoon Capt. Loraine came out on the Valkyrie racer, and accomplished a fine flight of 20 minutes' duration, the fog, however, preventing any attempt at high altitudes. A gale of wind kept the machines inside the hangars during the week-end, but on Tuesday morning weather conditions were good, except for some fog. At 9 a.m., Ridley-Prentice was out on the 35-h.p. Green-Valkyrie, and made a trial flight of a few circuits. The engine lifted its 12-st. pilot just like a Gnome, and before reaching the other side of the flying ground the machine was over 100 ft. up. Owing to the very thick fog Ridley-Prentice was unable to see the ground, and had to frequently *vol plané* during his flight. On descending, Chambers immediately ascended on the same machine, and flew his second test flight. This was accomplished in excellent style under trying conditions, his landings being very good, and we look forward to some big flights in the near future by this capable pilot.

Conditions were fairly good in the afternoon, and Buck opened the proceedings by making several very good flights. Then Capt. Loraine got in some practice at passenger carrying. He took up Lieut. Hawker, a Valkyrie pupil. Later, Mr. Barber put up a fine exhibition flight on the Racer, the flight including numerous *vol planés* and sharp turns. Buck then got some further practice, flying extremely well. At the same time Mr. Barber took up Lieut. Hawker for a few short flights, thick fog preventing any height. Capt. Loraine made the concluding flight of the day, flying splendidly until it was almost dark.

Salisbury Plain.

Air Battalion.—Wednesday of last week turned out to be a practically perfect day from a flying point of view, and the Air Battalion took full advantage of it. Capt. Fulton was flying on and off all day, and made several spiral *vol planés*. Lieut. Barrington Kennett made a good flight on the Nieuport, but, unfortunately, in landing, a bump in the ground caused a skid to go. He then went over to Bulford Camp on a Bristol military biplane to get some maps, and again met with ill luck. The gusty wind made the landing a bad one, and a skid was broken so that it was impossible to fly the machine back. Lieut. Hinds made a 25-minutes flight on the Breguet getting up to a height of a thousand feet and circling over Fargo, Rolleston and the Downs finishing with a fine *vol plané*. Lieut. Connor, who has been flying a Bristol biplane, made his first trial on a Blériot two-seater, but during rolling practice struck a patch of bad ground and as a result the machine had to be returned to the hangar for slight repairs. On a Bristol military extension biplane, Lieut. Reynolds flew over to Oxford in the qualifying tests for his superior certificate, the time taken being 54 minutes. On the return journey, however, he was forced to come down at Ramsley. An unexpected visitor arrived during the day in the shape of Mr. de Havilland, who had flown over from Farnborough in the tests for his special *brevet*. He made a splendid landing, and after staying a short time started off again for Farnborough, the machine rising to a good height very quickly. After this no further flying was put in, on account of the weather, until Monday, but all concerned found plenty to do in the hangars. On Monday Lieut. Barrington Kennett was out on his Nieuport monoplane, flying in a strong wind. There was a wonderful change in the weather on Tuesday, and the air battalion, as usual, made good use of it. Capt. Fulton was out on the Bristol biplane in great form, and Lieut. Barrington Kennett again had the Nieuport out, and, after one or two trial flights in it, changed over to the Bristol biplane, taking his brother for a lengthy jaunt at a height of about a thousand feet, from which altitude he came down by a fine *vol plané*. Lieut. Fox was also out making solo flights.

Bristol School.—Tuesday morning last week was too rainy and windy for flying. In the afternoon, England, Jullerot and Busteed each attempted a solo, but were soon forced to descend on account of the increasing force and fury of the twenty-mile-an-hour wind which had been blowing in gusts all day.

An ideal flying day followed on Wednesday, no fewer than 32 flights being made by the school. Lieuts. Borton and Porter, who promise to become very clever flyers, each flew solo for about an hour. Lieut. Wyness Stuart, an ex-pupil who took his *brevet* some time ago, turned up and did a little practice flying on one of the school machines. Jullerot was soon very busy, first of all taking up Mr. Stanley White, managing director of the Bristol Co., and afterwards Capt. Agostini of the Italian Army. Jullerot's next performance was made on one of the single-seater monoplanes—his first attempt on this type of machine. He flew very well, and, as he says, without any effort, for about 10 minutes, landing very smoothly.

Gordon England took up Mr. Stanley White for a 40-mins. flight in the neighbourhood of Salisbury town, afterwards carrying Mr. Farnall Thurstan, who took several excellent photographs from the passenger's seat. After this, Hotchkiss got up behind England, who then made a very fine exhibition flight.

Busteed took up Lieut. Porter, and afterwards made a solo on a single-seater monoplane, showing, by his handling of the machine that he is now a perfectly competent and capable monoplane flyer. Pixton made one solo on a biplane, and two on a single-seater monoplane, performing some very fine *vol plané* descents. After Hotchkiss had taken Lieut. Porter on No. 66, Valentine took Captain Agostini on the two-seater military monoplane. Valentine afterwards took his mechanic, and then made a solo, his landings being remarkably fine. Jullerot took Lieut. Manisty of the Air Battalion for a biplane flight, afterwards making a solo, which included some pretty figure eights. Pixton took Prier as passenger on a biplane, what time Busteed, in spite of a cross-wind, was getting a marvellous turn of speed out of the single-seater monoplane over the 5-kilom. course. A solo by Pixton on a single-seater monoplane concluded the day's work.

On Friday Jullerot made a flight with Bendall, Pizey taking Lieut. Ashton twice. Pixton made a circuit on the two-seater military monoplane, and Busteed a circuit on the single-seater. Rain and wind all the afternoon and evening stopped further work.

⊛ ⊛

Mr. Austen Chamberlain Visits the Bristol Aeroplane Works.

AFTER addressing a Unionist meeting in Bristol on Friday night last week, Mr. Austen Chamberlain, M.P., was the guest of Sir George White, Bart., Chairman of the British and Colonial Aeroplane Co., Ltd., with whom, on the following morning he paid a visit to that company's works at Filton. Here Mr. Chamberlain met Capt. Bertram Dickson, whom he had last seen flying in France. Mr. Chamberlain was extremely interested in the equipment and products of the works, and was shown the newly completed two-seater Bristol monoplane which is now being exhibited at the Paris Salon, where it is the sole representative of British aeroplane construction.

⊛ ⊛

An Art Catalogue.

IN these comparatively early days of the aeroplane industry one hardly expects to find very elaborate catalogues of aeroplanes, but France, in this respect, is a good deal ahead of us, and that issued by the Farman Frères is a striking example. It is most artistically got up, and contains a large number of clever photographs showing the Henry and Maurice Farman types in flight, as well as the Henry Farman monoplane. Full particulars of each type is given, as well as prices. The firm also publish a booklet, illustrated by photographs, explaining to the novice how and why an aeroplane steers. Our readers should write to MM. Farman, at 167, Rue de Silly, Billançourt (Seine)—the new headquarters of the firm—for a copy of their latest catalogue.

FLIGHT

AIR EDDIES.

WHEN I called at St. Mary's Hospital, Paddington, last Saturday, I found that Charles Hubert had so far recovered that he was able to indulge occasionally in a little walking exercise, and between whiles he takes short "flights" from one end of the ward to the other on a hand-propelled chair; rather an unexciting method of locomotion as compared with aeroplaning. He is at present at his home in Cherbourg, whither he hied on Tuesday last in company with his father, who possesses an extensive medical practice in that district.

• • •

As I mentioned some few weeks ago, there is some talk of Hubert carrying out preliminary tests on the monoplane which his brother, Jean Hubert, is at present constructing in Paris. This machine will undoubtedly be of considerable interest, as its constructor, who is himself an aviator, and who holds a position of some importance as engineer at the R.E.P. works in France, expects it to attain a speed of 110 kilometres an hour, equipped with one of the new 30-h.p. V-type engines. In my belief, Charles Hubert has the making of an exceptionally fine flyer, and with a really fast monoplane at his disposal should quickly attain a reputation as one of the finest exponents of the art.

• • •

The fact that Henry Farman, whose name one immediately connects with the biplane-type of machine, is exhibiting a new monoplane at the Paris Salon, which, by the way, opens to-day, does not by any means infer that he has lost any of his confidence in the double-decker.

On the contrary, he is still firmly convinced that this type of machine is the most suitable for the general run of military requirements. However, I believe the celebrated constructor is fully awake to the fact that, under certain exigencies, the monoplane is decidedly preferable on account of its superior speed, and to this we must attach his reason for dividing his love between the two types.

• • •

The folly of neglecting to recognise the value of the aeroplane for military use has been amply brought home to the Turkish War Authorities. Having a totally inadequate corps of army aviators and machines, the Turkish Government have had just lately to resort to public advertising in order to get in touch with aviators who were so much needed.

• • •

Advertisements appeared in the *Aérophile* and many other French aviation journals offering to engage aviators on a four months' contract at the rate of £240 a month if they possessed a machine, or £80 per month without. Replies were to be made by telegram to an office which had been opened at Bois le Duc in Holland. In addition to having their fare to Tripoli and back paid for them, the aviators engaged were to be presented with a bonus of £20 on their appointment, while their machines were to be fully insured against possible breakage. Altogether quite a nice little proposition for sporting pilots!

• • •

Africa is evidently not so dead to aviation as some would have us think, for I hear that an official luncheon has been given to the well-known aviators E. F. Driver and C. Compton Paterson, and their manager, Capt. Guy Livingston, in honour of their arrival in Cape Town. In proposing their health and success, Sir P. de Graaf, who presided, expressed the opinion that an air corps was a very necessary feature in military defence, and also the hope that room would be found for such an organisation in the defence scheme of the country.

⊛ ⊛

The Hydro-Aeroplane at Windermere.

ON the 7th inst., Capt. E. W. Wakefield's hydro-biplane, piloted by Mr. H. Stanley Adams, succeeded in traversing the whole length of Lake Windermere. The altitude varied from 60 to 100 feet, while the speed was in the neighbourhood of 40 miles an hour.

Fast Trip by Mr. Moorhouse.

ON the 8th inst. Mr. Moorhouse set out from Huntingdon to fly to Market Harborough, and climbing to a height of about 2,000 feet succeeded in doing the trip of 45 miles in 40 minutes, in spite of somewhat unpleasant weather conditions, there being a very cold wind blowing at the time.

A Mishap at Aldershot.

AFTER making a trial flight at Farnborough on the new Cody biplane, accompanied by a passenger, Lieut. Parke, R.N. made an unfortunate landing. He had made a circular flight of about five miles over the district, and when over Farnborough Common, dropping apparently too low, he was caught by a gust of wind. He, however, managed to steer the machine into some furze bushes, and although the machine was damaged considerably, the pilot and passenger escaped without serious hurt.

It is to be feared that in Russia little interest is taken in aviation, for one rarely hears of a Russian aviator who has attained international fame. This, however, was the case with Popoff and Efimoff, and it seems as though Malinsky will soon make a bid for similar honours, for this latter aviator, who qualified for his *brevet* on a Farman biplane in August, 1910, is at present making preparations to fly from Finland to Sweden, across the Gulf of Bothnia. Starting from Abo, he hopes to cover the 135-mile oversea flight to Stockholm without descending. Should, however, the bad weather that is experienced in that part of Europe at this time of the year make the single flight impossible, Malinsky will have the option of descending on the Aland Island, midway across the gulf.

• • •

I hear that Mr. Herbert Spencer is proposing to emigrate to Montreal in Canada next Summer, taking with him for exhibition and passenger flight purposes the Farman-type machine on which he has earned such an envious reputation down Brooklands way. At any rate he needs little introduction to the people out there, for in Canada the name of Spencer is as much identified with all branches of aeronautics as it is in England. Besides, if I remember rightly, an uncle of his met with tremendous success on a ballooning tour in that Colony not so very many years ago.

• • •

Rumour comes from America that one Roscoe Timson, of Lynn, Mass., has succeeded in building a model aeroplane that will soar perfectly in a wind without any motive power. If he has succeeded in making his model soar in an ascending current of air, he might have saved himself the trouble, for the Wright Bros., in their latest experiments, have amply demonstrated the practicability of this method of soaring, under very excellent conditions, it must be admitted. If Timson's model can extract its energy from a horizontal fluctuating wind, such as birds are able to do, he has indeed solved a great problem. At any rate, I hear that he is building a full-sized glider for his further experiments.

• • •

To have "reduced to its lowest terms" the Cody biplane, on which he had made such excellent progress, must have been a keen disappointment to Lieut. Parke, R.N., not to mention the machine's worthy owner.

Lieut. Parke at the time was actually starting for the "Mortimer Singer" with an "overweight" passenger and enough petrol to last six hours, a total useful load of 650 lb. The accident was a matter of sheer ill-luck.

• • •

As for the machine itself, it is rather interesting to have an opinion of its flying capabilities from the only pilot who has flown it, save its constructor, Mr. S. F. Cody. Lieut. Parke says, "the machine itself is perfectly delightful to fly, being very light and handy on the controls. I certainly don't think there is any machine to touch her as a passenger 'bus.'"

• • •

It is reported that an inventor from Milwaukee has been granted a patent which covers every means of maintaining equilibrium other than by manual means.

Looks as though there is going to be aeronautical repetition of the Selden motor car type of law suit!

"OISEAU BLEU."

⊛ ⊛

The Disaster at Filey.

A VERY important and helpful communication from Mr. R. Blackburn dealing with the regrettable accident at Filey by which Mr. Hubert Oxley and Mr. Robert Weiss lost their lives, as briefly recorded in our last issue, will be found on page 1082. It would appear that once again there is little doubt that the terrible disaster need never have been.

Flying at Eastbourne.

TAKING advantage of the fine weather on one or two days last week, Mr. F. B. Fowler and Mr. V. Yates put in some useful practice at Eastbourne Aerodrome. On the 6th inst., while Mr. Fowler was flying the Gnome-Blériot, a buckled wheel caused the machine to turn turtle and settle down on its back, fortunately without doing very much damage or injuring the pilot.

Models

Conducted by V. E. JOHNSON, M.A.

The relative Areas of Main Plane and Elevator.

Let the figure be supposed to represent a part plan of a self-rising model in so far as the fuselage and planes are concerned. In Figure (1) let P be the position of the combined central vertical mast (or spar) and chassis. We assume also that the model is supported by the wheels of this chassis and rear skid at K. Then the centre of gravity G will require to be slightly in the rear of P. If it be not so placed then the model, instead of rising, is just as likely (under

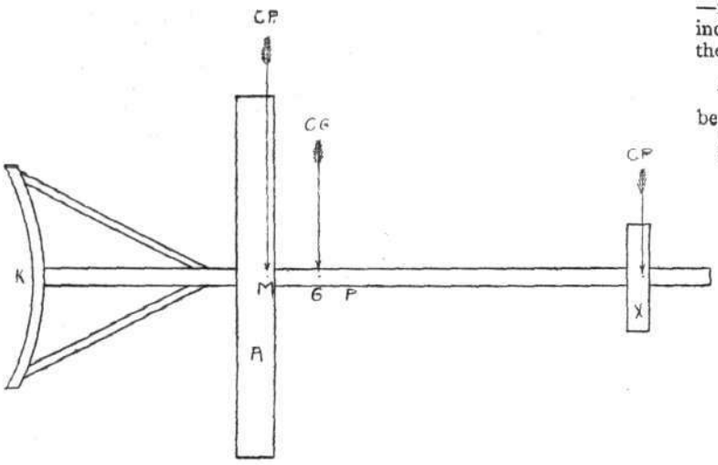


Fig. 1.

the thrust of the twin propellers) to dip its nose down and run along the ground like a dog following a scent. The centre of gravity meant is of the model complete with propellers and motor. The position of the main plane A is now fixed, *i.e.*, slightly behind G. The *position* of the elevator is also supposed determined, also the *area* of the main plane is supposed known.

To determine the size or area of the elevator. In Fig. 2 let A denote the area of the main plane and α its inclination to the line of flight, let x denote the area of the elevator and β its inclination to the line of flight; p and p^1 the centres of pressure; and γ the angle elevator makes with the main plane: now since α and β are small angles we may take the lift as proportional to the angle. The air pressure on A and x may therefore be taken as $A\alpha$ and $x\beta$ respectively, acting upwards at their centres of pressure p and p^1. By the laws of elementary mechanics the resultant of these two pressures is a force (say R) acting upwards and dividing pp^1 into two parts b and c proportional to $x\beta$ and $A\alpha$ respectively.

$$\text{Whence } \frac{b}{c} = \frac{x\beta}{A\alpha} = \frac{x(\alpha+\gamma)}{A\alpha} = \frac{x}{A}\left(1+\frac{\gamma}{\alpha}\right);$$

$$\text{or } x = \frac{Ab}{c\left(1+\frac{\gamma}{\alpha}\right)} \qquad \text{(i)}$$

Now A is supposed known, also b and c can be measured, because (in the case of flat planes) the distance of the centre of pressure from the leading edge is known at various angles of inclination from Rateau's diagram, and the *position* of the elevator is supposed fixed. In the case of a cambered surface or aerocurve with a curvature $\frac{1}{12}$th the span (say) the same is also known, and can be determined with a sufficient degree of approximation in other cases. But we have still left the factor $1+\frac{\gamma}{\alpha}$.

Now, if $\gamma = \alpha$, *i.e.*, if the inclination of the elevator were *twice* that of the main plane, then $1+\frac{\gamma}{\alpha}$ would equal 2, and our formula would become $x = \frac{Ab}{c2}$ (ii)

Now, if such an assumption be a fair one, and such as is found to work out in practice—with respect to this, or any other proposed substitution, I shall be glad to hear from correspondents—then we have a very simple and easily-applied formula.

Suppose we know A (position and area), but not G, the centre of gravity (in steady flight the upward pressure, R, obviously acts upwards through the centre of gravity); then, if we place at the point where the centre of pressure of the elevator will act a weight equal to the elevator (the *weight* of the elevator in, and balance the complete machine about a knife-edge, we shall know G, this case being a predetermined one), *i.e.*, we know b and c and x can be found.

In formula ii if we increase A (the other factors remaining constant) x increases—similarly if b be increased x is also increased—in other words, as we shift the main plane nearer κ we must increase the relative size of the elevator, and conversely as we bring the main plane further forward x diminishes.

As c is increased x diminishes, and also as the factor 2 (ii) or $1+\frac{\gamma}{\alpha}$(i) becomes greater.

All these results are borne out in actual practice.

The general tendency among model aero-modelists undoubtedly

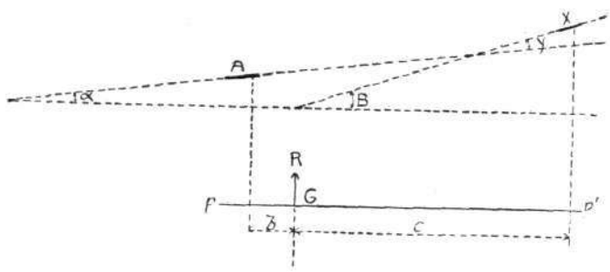


Fig. 2.

(primarily) to use elevators of much too large an area. Applying formula i to one of my own models to determine $1+\frac{\gamma}{\alpha}$, I find it gives a value 1·219. I shall be glad to hear what value others arrive at.

Next week—

"Plan Forms of Supporting Surfaces."

To Calculate the Pitch of a Propeller.

Take any point on one of the blades and measure carefully the inclination of the blade at that point to the plane of rotation.

Say the angle so formed is 15° (taken at the tip, say). Now 14·48°, *i.e.*, approx. 15°, is 1 in 4 (see any table of equivalent inclinations), say this point is 10″ from the centre, then every revolution this point will travel a distance

$$2\pi r = 2 \times \frac{22}{7} \times 10 = 62{\cdot}85'.$$

Now, since the inclination is 1 in 4, the propeller will travel forward theoretically one-fourth of this distance

$$= \frac{62{\cdot}85}{4} = 15{\cdot}71 = 15\tfrac{3}{4} \text{ ins. approx.}$$

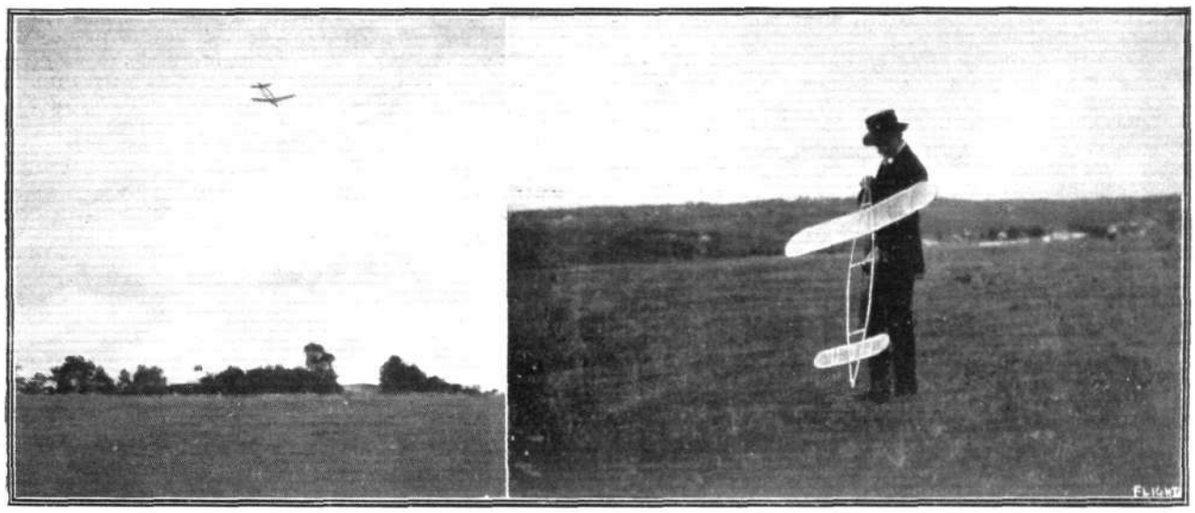
Similarly, any other case may be dealt with. The pitch is supposed uniform. If the blade be hollow-faced, take the *mean effective pitch*—such a blade has, of course, an increasing pitch from the leading to the trailing edge—considering any particular section.

An 8 in. propeller would want an inclination of about 37° at the tip to have a pitch of 2 ft. allowing for slip.

Propellers of different diameters, both having the same pitch, are not *similar*. They are similar when the pitch angle is the same.

Petrol Motors.

In the only successful small petrol-engined model that we know of the motor was a four-cylindered one and weighed complete 5½ lbs. and developed 1¼-h.p. at 1,300 r.p.m. The propeller was 29 ins. in diameter, and of 36-in. pitch, with a static thrust of 7 lbs. The machine had a spread of 8 ft. 2 ins., and a length of 6 ft. 10 ins. Total weight, 21 lbs. It soared at 16 m.p.h. The engine was air-cooled, and a double float-feed carburettor and single-coil ignition and distributor were employed. In another model, made by a well-known aeronautical engineer, the total supporting-area was 13·3 sq. ft. Total weight, 16 lbs.; engine, inclusive, 8 lbs. 14 ozs.; length of model, 5 ft.; span, 7 ft. 8 ins. Engine developed 1 h.p. at 1,500 r.p.m. Diameter of propeller, 25 ins. So far as we know, however, this model has never been tested in actual flight.



MR. H. P. WOOD'S INTERESTING AUSTRALIAN MODEL.—The result of two years' experiments and twenty-nine models. Best flight 300 yards.

Replies in Brief.

S. SAUNDERS.—You will be able to draw your own conclusions from our remarks above *re* petrol motors. We are afraid that anything less than 1 h.p. is out of the question. The diameter of your propeller is certainly too small. *Re* your question with respect to coils, consult the Economic Electric Co., of Twickenham. Why not try a carbonic acid gas motor? Excellent results have been obtained by these in France.

R. BAGLEY.—We are not at all surprised that you have had no success with your model. In the first place, it is much too heavy, and in the second, it is under-powered. Reduce the weight as much as you can, 3 ozs. if possible. Don't use umbrella ribs; they can only be used successfully in much larger models. Use 28 strands of T. W. K. Clarke's $\frac{1}{16}$-in. rubber, and as large a propeller as your machine allows, centrale type, and let us know the result. Lighten your propeller by sandpapering, and make the blade hollow-faced. No other kind of motor save a rubber one is possible with a model of this size, *viz.*, 11 ozs. Try rising from a strip of linoleum.

G. BRENT, J. EDWARDS.—Received with thanks, and shall use as soon as opportunity offers.

⊛ ⊛ ⊛ ⊛

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

MODEL CLUBS.

Aberdeen Aero Club (387, HOLBURN STREET, ABERDEEN).

RAIN completely spoiled meeting which was to be held on Saturday, only three members turning up at the flying ground. Some good flights were nevertheless obtained. The distance competition was postponed until the first fine Saturday. In the middle of the week Mr. L. Gray had some excellent duration flights of 30, 27 and 25 seconds. A workshop and clubroom have been acquired at No. 403, Holburn Street, where members will have every encouragement for the execution of model work. Meeting to-day (Saturday) at Kincorth, at 3 p.m. as usual. A meeting will be held at night, at 7 p.m., in the new clubroom. It is to be hoped there will be a large turn out of members on both occasions.

Aero Models Association (NORTH METROPOLITAN BRANCH).

A SOCIAL meeting of members of the North Metropolitan Branch will be held at 15, Highgate Avenue, Highgate, N., on the evening of Saturday, December 23rd, at 7.30 p.m. It is hoped that members and prospective members will make a point of being present, and the honorary secretaries Mr. Malcolm B. Ross, 15, Highgate Avenue, N., and H. Brosse, 9, Clifton Road, Crouch End, N., will be glad if they will bring with them anything of interest in connection with aero-models.

Bath and Somerset Aero Club (11, ELM PLACE, BATH).

A VERY interesting and instructive lecture was given by Dr. E. White, at the Church Institute, Bath, on Friday, the 8th inst., entitled "Aeroplanes and Gliders." Considerable amusement was caused as to the correct pronunciation of the various French words used in aviation. On the motion of Mr. G. E. Page, a hearty vote of thanks was passed to the lecturer. All members are looking forward to the summer, when competitions and flying meetings will be held. Enthusiasm during the winter months, alas! is allowed to slacken.

The hon. sec., Mr. S. H. Baker, of the above address, will be pleased to receive makers' catalogues for the use of the club members.

Birmingham Aero Club (8, FREDERICK ROAD, EDGBASTON).

THE annual general meeting of the above club takes place on January 3rd at 8 p.m. at 9, Belgrave Road. The report of the club's doings during the past year will be read, as well as the balance-sheet. All past, present and prospective members are invited to attend. At the last meeting it was decided that the subscription of all senior members joining after December 31st shall be one guinea yearly or 5*s.* 3*d.* quarterly, but for members joining before that date, the subscription to be 3*s.* quarterly. The junior members' subscription will be 5*s.* yearly.

Last Saturday saw Mr. W. Lunn trying to get a model to rise from the ground, but his experiments were put to an end by a buckled wheel. He then brought out his model the "Tumbler Pigeon," and gave an exhibition of what looked like tent pegging. Mr. H. Grahame Black, a new member, was getting some excellent flights with a Gordon Jones model, carrying a "passenger" on board.

On Sunday further experiments were carried out with Mr. E. Trykle's model glider. The cords to the planes were first tried 30 feet in length, and the glider, flying successfully at this height another 30 feet was added to the cords, after this another 30 feet and still another 30 feet of cord was added, by this time the supply of string giving out. The glider was now soaring nearly 120 feet high; there it remained for nearly half an hour, making quite a splendid sight and causing a deal of excitement when it made a dive, but recovered itself, and continued its steady flight. Next week-end we hope to be able to get the glider up at greater heights still, when attempts to photograph it will be made. This glider embodies the principle of Mr. E. Trykle's successful model, and is to the scale of the full-sized glider which he and Mr. B. W. Beeby will be starting shortly to construct.

Blackheath Aero Club (196, BROCKLEY ROAD, BROCKLEY, S.E.).

ON Saturday last several members were on the Kidbrooke ground practising with various types of models for nearly two hours. The ground was in such a wretched condition, being several inches under water, that it speaks volumes for the enthusiasm of those members who "paddled" over and over the ground to fetch their models. Many fine flights were made by Messrs. Dollittle, Williams, Slatter, Collins and Clark, and the latter's single-stick Victor monoplane showed great judgment by flying through the branches of some tall trees instead of coming to "roost" on the top of them, as is usually the case.

At the Grove Park Aerodrome, Messrs. Woollard, Pizey, and

Egelstaff gave some demonstration flights, and it is hoped to repeat these to-day (Saturday) at 2.30 p.m.

There will also be the usual flying at Kidbrooke and Lee, and Mr. L. Brough hopes to test a Victor hydro-monoplane on Blackheath at the usual time.

The following new members were elected :—Messrs. C. Ford and P. J. Thompson, of Brockley; Mr. W. Moncar, of Greenwich.

The committee have received further details of the models which members are constructing for the exhibition to be held on January 4th, at the Central Hall, High Street, Peckham, and the secretary will be pleased to allot space to any model makers of other clubs, who would like to show their machines, for which an early application should be made.

The committee wish to enrol a few more really enthusiastic model flyers, and the secretary will forward full particulars to any address.

The new members who do not know where the Blackheath Aero Club's grounds are situated are referred to FLIGHT issue dated October 28th, where they will find a map with full directions.

Brighton and District Ae.C. (Model) (36, LITTLE PRESTON ST.).

THE Committee, on the 6th inst., accepted the resignation of the club's indefatigable secretary, Mr. C. H. Barnett, who is leaving England. Mr. Axle Von Wichmann was elected secretary in his place. On Saturday last the club mustered strongly at Brighton-Shoreham aerodrome, when the weather was ideal: brilliant sunshine and a steady breeze which soon died away altogether; 103 flights were made by eleven models. Bate, who specialises in light, high-speed models, reached well over 150 ft. altitude. He also flew exquisitely built geared motor I—I—P_2 monoplane. Burghope flew his 21-oz. monoplane, which he drives with 70 yards of rubber. This machine covered 250–300 yards repeatedly. He is turning this giant model into a biplane, in order to get longer duration. Frost flew "baby" terrifically fast. Von Wichmann and Knowles both did well. At one time nine machines were started together, providing a very exciting half minute. Several models "hydroplaned" into big puddles, and some sheep were quite nonplussed at the action of Bate's fast models. Kirkwood is completing a new type of monoplane. Flying to-day (Saturday, 16th) at Shoreham. General meeting, Thursday next at eight o'clock.

Conisborough and District Aeroplane Soc. (18, CHURCH ST.).

ON Saturday C. C. Allport succeeded in gaining his First-class Certificate, he being the first member to achieve this distinction. He also was the first member to win a Second-class Certificate, and the club heartily congratulates him. On the same date, T. S. Wallis gained his Second-class Certificate. Master B. Clarkson made a good flight of 540 ft., the more praiseworthy from the fact that he is the club's youngest member. R. Jarvis and W. Silmore also made good flights, while J. E. Greathead had the misfortune to smash his planes. C. C. Allport also, on 11th inst., broke club's official record with flight of 645 ft., F. J. Wright's 1,280 ft. on 3rd inst. being unofficial.

Glasgow Boy Scouts' 48th Troop Model Aero Club.

ON Monday evening last Scoutmaster J. S. Gordon gave a short lecture on "The Aeroplane, its parts and their functions." The address was illustrated by blackboard sketches, and a scale model of the Martin-Handasyde racer-type monoplane. Afterwards the boys were questioned on what they had heard, and everyone was able to name correctly any part of the model pointed out. On Saturday, at Ibrox, Scout John Welsh passed the practical test for the aviator's badge, his model making flights up to 400 ft. Scoutmaster Gordon also made some fine flights, as noted elsewhere.

In the evening the usual busy scene was witnessed in the workshop where several new models are under construction, one of them being evolved from experiments with a paper glider. The club has a fine hall suitable for models rising under own power, and several of these are now being made.

The library contains some of the latest books on aviation, the newest one being, "The Principles of Flight," whilst FLIGHT and other periodicals on the subject are taken in every week.

The next lecture will be given in the hall on Monday evening, 18th inst., at 8 o'clock, when the subject for discussion will be "The War Aeroplane."

Paddington and Districts Aero Club (2, EDBROOKE ROAD).

THE reorganisation of this club was completed on Saturday evening last at a special meeting. Mr. Hurlin, who has for so long held the position as secretary, and was, in fact, founder of the club, has been obliged, through pressure of business, to resign the post, and Mr. Evans, of 133, Buchanan Gardens, College Park, was unanimously elected for the post. The club has a splendid programme before them, and a special committee, together with various officers, have been also elected, whose names will appear next week. As mentioned when the club was first formed, the certificates will be awarded, and it is claimed that this club was the first to offer certificates of any kind to its members. Of course, it is open to contradiction and we shall be glad to give way in this respect if any other club holds the first place, so we give the date of our decision regarding certificates, viz., January, 1910. We hope to send a copy of the special design to the Editor of FLIGHT for publication.

In order to make the workshop more popular, and to entice members to use it during the winter, four separate prizes are to be offered for models which must be made entirely in the shop, and throughout by the members. We hope to give fullest particulars next week as to conditions.

It was decided that lady members, a few of whom *are* at present still in the club, shall have "special attention" in regard to their taking a more active part in the club's programme. The subscriptions are as follows :—General members, 1*s.* per month or 10*s.* 6*d.* per year. This includes use of workshop, private ground, glider, entrance to all competitions arranged by the club or lectures, free entry to competitions for certificates—first, second and third class. Or, associate members, 2*s.* 6*d.* per year. This only entitles to use of ground and free entry to club competitions; associates wishing to obtain certificates will pay small inclusive fee.

New members elected were Mr. Waller, Mr. Stone, Mr. Brooks. Hackney Aero Club still wants members. All further communications to be addressed to Mr. Evans, 133, Buchanan Gardens, College Park, for Paddington, and for Hackney please address "Hackney Secretary," same address.

Palmer's Green and District Model Ae.C. (15, MOFFAT RD., N.).

IN spite of a high wind last Saturday a good bit of flying was done. Mr. E. Brown's modified Mann monoplane was responsible for some good work, and made the best distance (403 yds.) and the best duration (55 secs.) of the day. Its performances were done on 800 turns of the elastic.

Mr. A. Rogers' "barge" proved to be very buoyant in adverse circumstances, and flew its 343 yds. in fine style. The graceful manner in which this model got along with only one propeller in motion, owing to a broken strand of rubber, caused some surprise, and said much for the stability of the machine.

Mr. R. L. Rogers' 3 ft. 3½ ounce model has been doing some interesting performances during the week. With 750 turns of the four strands of quarter strip rubber a side, it climbed rapidly to an altitude of about 60 ft., and made a duration of over 40 secs. Its total surface amounts to 87 square inches.

After the afternoon's flying on Saturday, a very enjoyable meeting was held in the Club Room, Bowes Parade. The question of certificates was discussed, and it was decided to award according to distance, 600, 400 and 200 yards being respectively the qualifications for first, second and third-class certificates. Flights to be recognised must be observed by two members other than the candidate.

It was unanimously agreed that the present ground was now unsuitable and all efforts are being made to secure better flying accommodation.

A flying competition has been arranged for Boxing Day at eleven o'clock, and will consist of two events, viz., distance and duration. All members from other clubs will be cordially welcomed. Full particulars may be obtained on application to the secretary.

Putney & Wandsworth Flying Club (3, GROVE COTTAGES, S.W.).

A SUCCESSFUL afternoon's flying was carried through by the intending members of the above club, on Barnes Common, on the 9th inst. Mr. Hall's 2 ft. model repeatedly put up flights of 250 to 300 yards and durations of 40 to 45 secs. One flight ended in the middle of a football field, where a match was in progress, and the model suffered from an enraged player, probably of the losing side. Mr. J. Smith's model, although not tuned up, on one occasion flew 350 yards. Mr. D. Smith flew his 3-ft. monoplane in his usual brilliant style at great speed, but had trouble with elastic. Once one of the models was lost for over an hour, but was found ultimately located in the branches of a high tree.

A gathering will be held on Barnes Common to-day (Saturday) at 3.15 p.m., the same as has been held for months past. All interested please communicate with the joint secretaries, J. C. Smith, of above address, or S. C. Hall, Lonsdale House, High Street, Barnes.

St. Mary's Model Ae.C. (THE VICARAGE, KINGSTON, PORTSMOUTH).

LAST Saturday was a most disastrous day for the members. A good percentage turned out, but owing to the very heavy wind, smashes were the order of the day, and only one machine came home intact. The next ordinary meeting is on the 20th inst., at 8.30 p.m.

Scottish Ae.S. (Model Aero Club) (6, MCLELLAN ST., GOVAN).

On Friday evening last week Mr. Foster gave an excellent lecture on the "History of Aviation." There was a large turn-out of members and friends, and the lecture was much enjoyed. Afterwards there was a discussion on competition rules, as it is intended

to have a monthly competition during the coming year, particulars of which will be duly notified in FLIGHT.

Several members also brought their pet paper gliders, some of which were extremely interesting. Mr. Mills, who brought an improvised twin-crew helicopter, succeeded in making it rise from the floor to the ceiling. On Saturday there was a fine turn-out of members at Ibrox, though the ground was several inches under snow.

There were no official results taken, though some of the flights were most remarkable. On making one of its customary cross-country flights Mr. Gordon's model was caught in the telegraph wires over the railway and had to be dislodged with snowballs.

There was no damage done, and the same machine made several illuminated flights later on, which caused much amusement. The Assistant Secretary has ordered a large quantity of "sparklers," and these can be had at the flying ground, so that illuminated flying will become a regular feature. It was noticeable that the only persons who felt the intense cold were the non-flyers, which proves that model flying is a health-giving sport as well as a scientific one.

There will be practice flying at Ibrox to-day (Saturday), also several members will visit Barrhead Aerodrome. Members and friends will please note that flying meetings will be held every Saturday at Ibrox until further notice. The next lecture will be given in the Institute, Elmbank Crescent, Glasgow, on Friday evening, the 22nd inst., at 8 o'clock, when Mr. Philips, of the Anderston Library, will address the company on "Aviation from a Literary Aspect." The brilliant selection of aviation books now in the Glasgow Public Libraries is greatly due to the efforts of Mr. Philips, so that one can see that his interest in the science is not merely a passing one. As mentioned in previous issues of FLIGHT, all are invited to attend, and there is no obligation to join.

Stony Stratford & District Kite & Model Ae.C. (OLD STRATFORD)

THE second meeting of the fortnightly series was held on the 7th inst. at the club room, Baptist Church Institute. The minutes of the previous meeting were read and confirmed. The secretary read the circular letter from the Kite and Model Aeroplane Association *re* affiliation, and a discussion followed regarding same. Correspondence was also read from Mr. Grimmer relative to a proposed lecture by him, but the idea was abandoned, owing to lack of support financially. The chairman then called upon Mr. C. L. Matson for his address "Gliding Models," which proved highly interesting and educational, Mr. Matson explaining the various methods in use of obtaining stability by demonstrations with paper models of various machines where a special point of the method which the designer has adopted for stability was made. A vote of thanks was proposed by the Chairman (Mr. Field), and seconded by Mr. Watson, to Mr. Matson for his able address.

Members are reminded of the next meeting, Dec. 22nd, when Mr. Moore will address the members. Owing to the unsuitable nature of the weather there is nothing to report from the club flying ground; only four members were present on Saturday, practically nothing being done.

Yorkshire Ae.C. (Model Section) (5A, HULLAND ST., LEEDS).

DISCUSSION *re* building of a glider must be postponed till Saturday, December 23rd, owing to the Drill Hall being engaged on the 16th. All members please be present at the discussion, when a meet will be arranged to take place during the Christmas holidays.

Bristol Model Flying (3, ROYAL YORK CRESCENT, CLIFTON).

AT a meeting held at No. 16, Berkeley Square, on Dec. 6th, the Chairman (Mr. Tivy) pointed out that the unofficial flying meetings held on the Downs had been very encouraging, and that it was now proposed to form a Society to promote more especially the experimental side of aviation. Mr. Alan-Jenkins, who was present, suggested that it might be possible to amalgamate with the Bristol and West of England Aero Club as a Model Section. It was decided that before taking any definite steps it would be well to ascertain on what terms affiliation with the Kite and Model Aeroplane Association could be carried out. Several gentlemen promised the loan of books to form the nucleus of a Club Library. It is proposed that the subscription shall not exceed 7*s.* 6*d.* per annum (payable quarterly), and in the event of sufficient members joining this figure will be reduced.

Next meeting will be held at above address at 7.30 p.m. on Wednesday, December 20th. All are welcome at this as well as the model flying meeting on Downs (Sea Walls), at 3.15 p.m. to-day (Saturday).

SCHOOL AERO CLUB.

Southgate County School Ae.C. (FOX LANE, PALMER'S GREEN).

A COMPETITION for distance of flight will be held on Thursday, December 21st, at 2 p.m., at Powys Lane, Palmer's Green, when a pair of propellers will be offered as first prize. Competitors may have any number of flights, but none will count after 4 p.m. Will all members please endeavour to be present *with models*.

The use of the School workshops has been obtained for members on Tuesdays at 4.30 p.m., and it is hoped they will avail themselves of this opportunity.

Catalogues, etc., would be greatly welcomed by the Hon. Sec. at the above address.

⊛ ⊛ ⊛ ⊛

FOREIGN AVIATION NEWS.

Another Win for Grahame-White.

BY cable we learn from New York that the Judges in the Federal Courts have decided against the Wright Brothers in the suit for infringement brought by them against Mr. Claude Grahame-White, in respect of the Henry Farman and Blériot machines used by him in various competitions in America. A later cable states that Grahame-White has been restrained by Judge Hand from flying in the United States without the permission of the Wrights.

Trying for the Passenger Height Record.

HAVING returned to his old love, the Voisin biplane, Bielovucic, at Issy, on the 6th inst., made an attempt to beat the world's passenger record for altitude. During a flight of three-quarters of an hour he was out of sight for about 10 mins., but on his descent the barograph only registered 1,800 metres, and so the record remained unbeaten.

From Chalons to Vincennes, *via* Amiens.

ON the 5th inst., Lieut. Lelievre, on a Blériot monoplane, successfully made the journey from Chalons to Amiens. He was weather-bound there for some days, but on the 8th he was able to get on to Tille, near Beauvais; and on Saturday continued his journey, and landed at Vincennes in good form.

A Biplane with Triplane Tail.

SEVERAL trials have been made lately at Villacoublay by Rene Labouchere with a biplane built to the designs of Captain Dorand. This machine is of extraordinary appearance, owing to the great number of stanchions between the two main planes. The engine and propeller are arranged in front, while the tail is of the triplane type. Several flights have been made with passengers up to an altitude of 300 metres.

At The R.E.P. School.

AT the R.E.P. School at Buc on the 6th inst., Lieut. Maurice made a very fine flight of half-an-hour's duration, and Lieut. Lussigny, testing for height, went up 400 metres in nine minutes. Amerigo, with Captain Faure on a two-seater, was up for three-quarters of an hour, while Bobba testing a new military monoplane, alternately took his brother and sister for flights.

When East Meets West.

A CURIOUS situation has arisen at the Blériot School at Pau, where seven Italian officers are being trained as aviators, and they are taking their turn on the school machine with two Turkish officers, who are also anxious to fly.

Hanriot Up for an Hour.

ON the 6th inst., Marcel Hanriot was flying with M. Pomier as a passenger for over an hour over the environs of Rheims. In the meantime his father was making a lengthy cross-country trip with a monoplane fitted with a 100-h.p. Aviatic engine.

More Deperdussin "Superior" Pilots.

THREE pilots, Gaillard, Soyer, and Raulet, at the Deperdussin school at Ceurcy Betheny, made flights for their superior *brevet* on Sunday, the course taken being from Rheims to Mourmelon and back. Lieut. Boncour was also flying on his Deperdussin monoplane across country for over an hour during the afternoon.

A Busy Day at Blériot Military School.

ON Sunday, at the Blériot military school at Etampes, Lieut. Do Hu and Lieut. Massol each made two flights for their superior

certificate. Delivery of three new two-seated machines was taken by Capt. Destouches, and one way and another sixty different essays were made by the various pilots and pupils at the school during the day.

Lieut. Lucca Goes for Superior Brevet.

ON the 7th inst., Lieut. Lucca on his Maurice Farman bipiane, passed the first test for his superior military certificate, flying from St. Cyr to Chartres and back, a distance of 120 kilometres.

Regular Cross-Country Flights.

DURING the end of last week Naval Lieut. Lafon made regular daily trips on his Blériot monoplane from Etampes to Toury and back, which it will be remembered was the course of M. Blériot's historic first cross-country trip.

The Blériot Military School at Etampes.

UNDER the energetic direction of Capt. Felix, every advantage is taken of favourable weather by the Blériot School at Etampes, and Capt. Felix personally gives a lot of instructional flights to the various pupils. On the 7th inst. Lieut. Lebleu made the necessary cross-country flights to qualify for his superior certificate.

At the Maurice Farman Military School.

AT the Buc Military School at the Maurice Farman aerodrome on the 7th inst., Lieut. Battini, with Lieut. Cesari, was flying for an hour at a height of 1,100 metres over a circuit, the points of which were St. Cyr, Trappes, and Versailles. The same day Lieut. Marzac was up for a couple of hours flying over Chartres, Rambouillet, Limours, and St. Cyr.

Vedrines Has a Fall.

WHILE flying very low, during some trial flights with a new monoplane at Villacoublay, Vedrines met with an accident. While making a turn one side of the aeroplane touched the ground and overturned the machine. Some soldiers who were at hand at once got the pilot clear and hurried him to the hospital. It was at first feared that he was seriously injured, but according to later accounts the worst is a dislocated shoulder and some rather bad bruises.

Molla Flies for an Hour.

AT Douzy, on Monday, Molla was flying for an hour on one of the new Sommer monoplanes.

Nieuports for Russian Army.

THE first of a large batch of 50-h.p. two-seater Nieuport monoplanes ordered by the Russian military authorities was delivered at Mourmelon on Monday, the trials being made by Gobe and witnessed by Lieuts. Nyne and Dibowski.

The Blériot Limousine in the Air.

IT will be remembered by those who followed the record of aeronautics in the columns of *Auto.* before FLIGHT began its separate existence, three years ago, that in the early days when the dirigible was coming into vogue M. Deutsche had a dirigible, "The Ville de Paris," built, and used it for the purpose of going to the meet. He has adopted a similar procedure with the aeroplane and after the Paris Salon he may be seen visiting his friends in his flying limousine which has been built by M. Blériot. At its trials at Etampes, on the 6th inst., with Perreyon at the wheel, the new machine performed very well, and those who had the opportunity of examining the details were greatly taken with the arrangement of this latest development of aerial craft. After some further trials on the following day the machine was dismantled for transmission to the Grand Palais where it is sure to be a great attraction during the Salon which opens to-day (Saturday).

Farman Machines at the Salon.

NOT the least interesting exhibit at the Paris Salon opening to-day is the new Henry Farman monoplane, full details of which are given elsewhere in this issue. On the same stand will be a small Maurice Farman biplane with staggered planes, both of which, in view of the splendid records of success achieved during the past year, are likely to be a centre of attraction during the Exhibition.

Another Michelin Prize.

AT a banquet of the Aero Club of France held on the 7th inst., Count De la Vaulx read a letter from M. Michelin offering a sum of 10,000 francs by way of complementary prizes to the target prizes. This latest addition is to be divided amongst the inventors and constructors of sighting instruments, projectile distributors, speed indicators, and altitude recorders employed by the competitors in the 1912 competition for the target prize.

A Medal for Bregi.

FOR his services in Morocco, and especially for his flight from Casablanca to Fez, Bregi, the Breguet pilot, who is also a *sapeur aerostier* in the Third Regiment, has been awarded the military medal by the French Minister of War.

Cattaneo at the Front.

CATTANEO, who has been flying quite a lot on his Gnome-Blériot for several months in the Argentine, is, incidentally, a lieutenant in the Italian Army. He has now been recalled to Italy in order that he may place his expert knowledge and experience at the disposal of the officers at the front in Tripoli.

Death of Lieut. Loder.

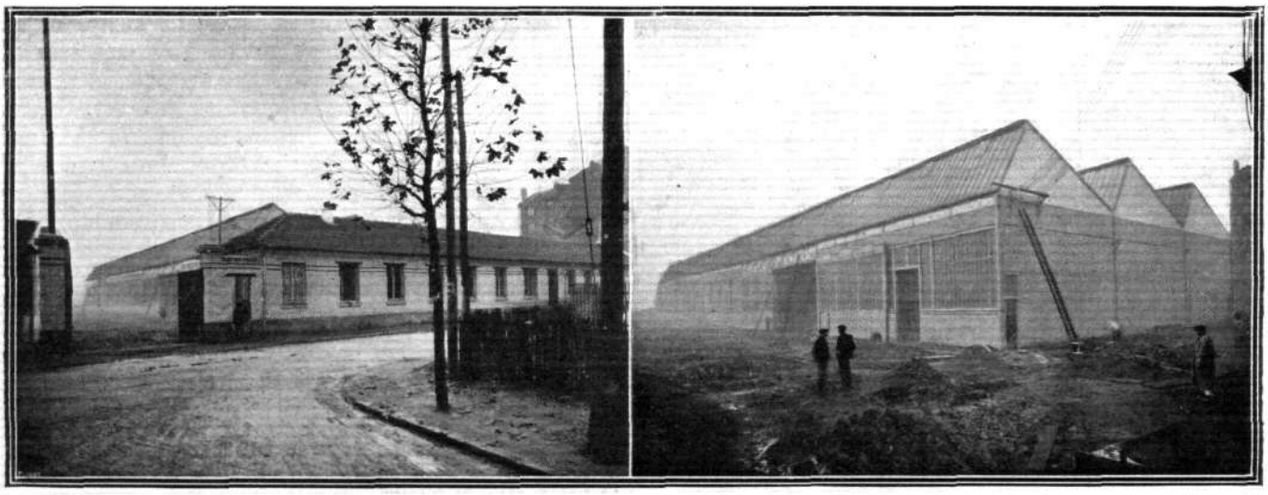
AFTER being in the Military Hospital since the accident which occurred while flying with Lieut. Benda at Versailles on May 6th last, Lieut. Loder died on the 7th inst. It was known from the first that his case was hopeless, as his spinal column was fractured in two places, and it is extraordinary that he survived the accident so long. He was decorated with the Legion of Honour by General Roques within a few days of the accident occurring.

Bathiat has a Stormy Voyage.

KNOWING his Sommer machine well, Bathiat did not hesitate to make a journey from Douzy to Rheims on the 5th inst., in spite of the rain, wind and fog at the start. During the trip, which took 1 hr. 10 min., his monoplane was very badly tossed about, and his arrival at Rheims caused no little surprise.

Long Flights at the Borel School.

SOME long flights have recently been made at the Borel Military School at La Vidamee. On Saturday, Lieut. Machin was up for 2½ hours, flying over Senlis and the surrounding country;



The new French works which have been erected at Rue de Silly, Billancourt (Seine), for the construction of the Henry Farman machines, in order to cope with the volume of orders which are being received by the firm.

while Lieut. d'Abrantes, during a lengthy trial, was well over 1,000 metres high, from which he descended *en vol plané*. On Monday, Lieut. Magnin made a 2-hour flight, and landed at the Corbeaulieu Aerodrome at Compiegne.

Verrept and Mesteach were also flying on the 5th inst., the former going for altitude, and getting up to 2,500 metres, while the latter made a cross-country trip of an hour and a-half, and at one time was over 2,000 metres high.

Activity at R.E.P. Military School.

IN view of the arrival of twelve additional officers just attached to the R.E.P. School for instruction, Lieut. Maurice, on Saturday, was testing five new school machines, and afterwards took four of the officers for their first flights.

The U.S. Naval Hydro-Aeroplanes.

A SECOND Burgess hydro-aeroplane has just been delivered to the United States Navy after having been tested during a 20-minute flight in a 25-mile wind by Lieut. Rodgers. It is stated that one of these machines is to be attached to the battleship "Ohio," and to take part in the Atlantic Squadron manœuvres. Lieut. Rodgers and Mr. W. Starling-Burgess are to pilot it.

A Long Spiral Glide.

WHILST flying recently at Houston, Texas, Charles F. Walsh, at the end of forty-five minutes, found himself at a height of 5,000 feet with his petrol tank dry. He, however, successfully landed by a spiral *vol plané*.

American Fatal Accident.

TOD SHRIVER, who has been making some very good flights on a biplane lately, was killed at San Juan, Porto Rico, on the 4th inst., while trying a monoplane, which fell from a height of 200 ft., and subsequently caught fire.

American Imports and Exports of Aeroplanes.

DURING the past three months aeroplanes to the value of more than £15,000 have passed through the New York Customs House, either going into the country or coming out.

AIRSHIP NEWS.

The "Capitaine Ferber" off the Stocks.

PILOTED by Count de la Vaulx the new Zodiac dirigible "Capitaine Ferber" made its maiden voyage on the 6th inst., when with nine persons on board and 1,200 kilogs. of ballast it cruised above its hangar for over an hour. It also made a long trial on the following day, this time carrying ten people, 1,000 kilogs. of ballast and 550 litres of petrol.

More Records for "Adjudant Reau."

THE dirigible balloon records for altitude as well as duration and distance are now to the credit of the Astra-built airship "Adjudant Reau" as on the 6th inst. during a voyage from Issy to Versailles and back which occupied 1 hr. 50 mins. the vessel was piloted by M. Roussel to a height of 2,150 metres. The previous record, 1,967 metres, was made by the "Adjudant Vincenot" and it is interesting to compare it with the aeroplane record, 3,910 metres, and the balloon record 10,500 metres. The distance and duration records, 917 kiloms. in 21 hrs. 20 mins. 50 secs. were made by the "Adjudant Reau" last September.

German Airship Manœuvres.

THE manœuvres which have been carried out at Cologne with "Z 2" and "M 2" concluded on the 4th inst., when the Zeppelin cruiser made a couple of short trials. "M 2" finished its work on the previous day, and was then deflated and packed up to await the spring time. As to the result of the tests nothing definite is known, of course, but it is understood that the bomb-dropping experiments were very successful, while "Z 2" is said to have shown herself capable of a speed of over 75 kiloms. an hour under unfavourable conditions.

Next Year's Gordon-Bennett Balloon Race.

IT is probable that next year's balloon race for the Gordon-Bennett trophy, which is to take place in Germany, will start from Stuttgart.

⊛ ⊛ ⊛ ⊛

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Aeroplane Efficiency.

[1444] On the occasion of Mr. Berriman's lecture on Aeroplane Efficiency at the Royal Society of Arts, I put forward, at his request, a few particulars which it was thought would have some practical interest to other designers.

This was expressed in the form of what I will now call the *Aircraft Factory Chart*, and indicated almost all the more commonly required constants of the aeroplane. It was employed to analyse three aeroplanes, each of entirely different form, made and designed or re-designed at the Aircraft Factory, and it showed as follows :—

1. The best speed for minimum petrol consumption.
2. The best speed for climbing, and how to select it.
3. The best speed for minimum horse-power of engine.
4. The best angle of incidence.
5. The available margin of power at various speeds.
6. The range of possible flying speed with a given engine and aeroplane.

It can be made to show at once the effect, in a general way, on all these matters, if increasing the weight alone, or of increasing the wing area alone.

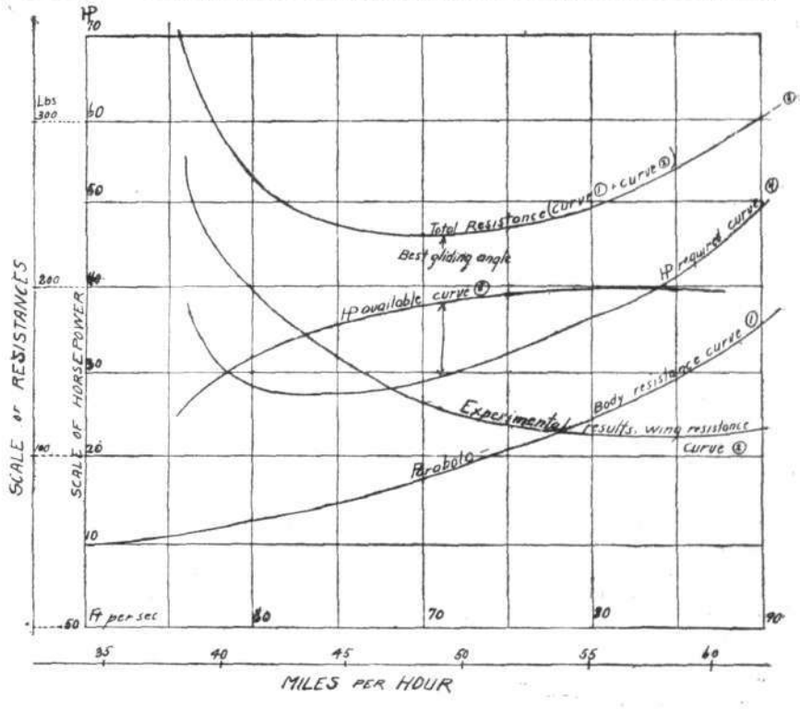
One speaker claimed for this chart a general resemblance to some curves that emanated from France in 1903. This may be, but though I am willing to refrain from putting forward a claim to priority in anyone's name, it is now the duty of that speaker to make good his further assertion that therefore priority belongs to some 1903 publication.

MERVYN O'GORMAN.

The Aeroplane in War.

[1445] It is rather difficult to find patience when your correspondent, Mr. Hambling, talks of chain shot or linked shell. Let it suffice to say that nothing of the sort is possible, unless we return to smooth-bore guns, and that, even in that case, such a projectile is only fit for use at very short ranges.

It is perhaps encouraging to find that it is generally agreed that aeroplanes will have to be armed, and that the peace-at-any-price machine, which scouts without fighting, is only a dream. If your correspondent had read my letters carefully, he would realise that I suggest at present machine guns for use against other aeroplanes,



bombs for use against dirigibles, or terrestrial targets. The assumption that I intended bomb guns for use against other aeroplanes in the air is amazing. But, as another correspondent of yours remarked some weeks back, correspondence on aerial matters just now does not run on ordinary lines, so let it pass.

As regards weight, which is a crucial point, a gun to fire efficient shrapnel must weigh at least six hundredweight, and its mounting as much more, whereas you can get a good machine gun, mounting and all, for about one hundredweight, and a light one, such as the Rexes, for about twenty pounds. Besides, as I said before, I do not see how you will make any sort of practice with a gun owing to unsteadiness. A bomb tube need not weigh more than 20 or 30 lbs.

A gun firing shrapnel might possibly be used from a dirigible, though it must be risky; and if this could be done the dirigible would have a good chance of keeping aeroplanes at a distance. If dirigibles are not efficiently armed it looks as if they will be at the mercy of the aeroplanes.

Your correspondent does not yet appreciate the difference between practice with a gun and with bombs from an unstable platform. When the bomb rolls out of its tube under the influence of gravity the angle at which the tube is canted goes for nothing, the trajectory only begins as it leaves the tube. With a gun the least cant takes the shot right off the target. It would be comparatively easy to hang the aiming apparatus of the bomb tube gymbals, but it is manifestly impossible to hang the gun and its mounting in gymbals. The whole question is most interesting, and I should be glad to discuss it with anyone who has a knowledge of gunnery under difficulties. It is a matter that may affect the vital interests of our Empire at any moment. As things are now my definite opinion is that aeroplanes should carry bomb tubes, because they are light and could make fair practice against certain targets, but that guns firing shrapnel should not be carried because of their weight and the difficulties of making good practice. When aeroplanes are more powerful and more steady things may be different.

It is absolutely necessary to cut down weight as far as possible unless we have more powerful engines, and speed and lifting powers must be the governing factors in aerial warfare.

Your correspondent forgets that clouds and fogs *do* provide cover for aeroplanes when scouting on many days in the year.

R. A. (Retired).

Study of Bird Flight.

[1446] In Dr. Hankin's "Study of Bird Flight," Chap. 35, he puts forward a suggestion that rotation round the longitudinal-axis is produced by advancing one wing. May I venture to give a few reasons for doubting whether the said rotation could be produced by this alone.

When a bird gliding with wings level and straight advances one wing the result is that the particles of air pass diagonally across the advanced wing, this means that they travel a greater distance between the leading and trailing edge, the said edges remaining on the same relative horizontal plane as before. This, of course, is equal to a smaller angle of incidence in the advanced wing, consequently the wing descends. However, the case would be different if the wings were set at an upward dihedral angle; in this case the path of the particles of air, on the advanced wing, besides being diagonal, and, therefore, longer, would be from a higher point on the leading edge, and to a lower point on the trailing edge, than in the straight wing. This means that by placing the wings sufficiently dihedrally up the angle of incidence can be made to remain constant or to increase, when the wing is advanced.

After all, travelling straight with one wing advanced is practically the same as travelling sideways with both wings advanced, except that in the latter case there is pressure on the side of the body, which would tend to increase the lift of the forward wing, and lessen that of the other, and so tend to produce more canting than in the former case.

I once experimented with a model glider made like a bird, each wing was fixed to the body by a bendable piece of wire, and my object was to find the position of wings which, when struck by a side wind, would remain on an even keel; my conclusions were as follows (the centre of gravity was a little below the level of the wings), if the leading edges are in line, there must be a slight downward dihedral angle; if the wings are advanced they must be straight or dihedrally up, according to the degree of advancement, if retired the dihedral angle must be downward.

From this it will be seen that everything depends upon the dihedral angle. It will be interesting to know whether Dr. Hankin has noticed what this was when the rotation occurred.

Of course, these remarks only apply to ordinary gliding, in soaring flight the bird *may* be taking energy from the air in a way which upsets all our calculations.

New Malden. H. S.

NEW COMPANY ISSUE.

The Scottish Aviation Co., Ltd.

UNDER the above title a prospectus has been issued inviting subscriptions for 16,000 shares at 5s. each out of a total share capital of £10,000 divided into 40,000 shares of 5s. each, there being no preferred or deferred shares. Four thousand 5s. shares of this issue go in part payment to the vendor, and the balance of 20,000 shares is reserved for future issue.

According to the prospectus the Company has been formed for the purpose of manufacturing aeroplanes and accessories and appliances connected with aerial navigation generally, to conduct a school of aviation, and specifically to acquire the aerodrome at Barrhead about five miles from Glasgow, consisting of fully 60 acres of land, held under lease by the Scottish Aviation Company, the vendors to this Company. Considerable money has been expended in adapting the property for the purposes of an aerodrome and in the erection of hangars, &c., and it is claimed that the property now forms the finest aerodrome in Scotland. An important agreement has been entered into with Messrs. A. V. Roe and Co., the well-known aeronautical engineers, whereby the sole right in Scotland to build "Avro" aeroplanes is vested in the new Company, so that they are in a position to immediately manufacture this reliable type of aeroplane without incurring the cost of experimenting.

The General Officer Commanding in Chief, Headquarters Scottish Command, Edinburgh, has made arrangements with the proprietors with regard to the training of officers in aviation, at once giving the school the prestige which such an arrangement carries. A responsible board of directors is at the head of affairs including Mr. Walter Gray Duncan, the late Hon. Secretary of the Scottish Aeronautical Society, and joint manager of the Lanark International Aviation Meeting; Colonel Thomas Ramsay, V.D.; Mr. Macnab, Mr. James Clinkskill, two engineers; Mr. A. V. Roe, the designer of the Avro machine, and Mr. F. Norman, who will act as Managing Director. In addition an Honorary Advisory Committee has also been appointed.

In regard to profits the prospectus estimate of the revenue is £3,260 as against expenses of £2,000, giving an annual net profit of £1,260, which would be sufficient to pay a dividend of 15 per cent. on the present share capital issued, after placing £500 to reserve.

The subscription list opens on Monday next and closes on or before December 20th, the Secretary and Offices of the Company being respectively Mr. T. H. Campbell, jun., 60, Bath Street, Glasgow. The detailed prospectus appears in our advertisement columns.

PRINCIPAL CONTENTS.

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard

SUBSCRIPTION RATES.

FLIGHT *will be forwarded, post free, to any part of the world at the following rates:—*

UNITED KINGDOM.	s.	d.	ABROAD.	s.	d.
3 Months, Post Free ...	1	8	3 Months, Post Free ...	2	9
6 ,, ,, ...	3	3	6 ,, ,, ...	5	6
12 ,, ,, ...	6	6	12 ,, ,, ...	11	0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., *and crossed London and County Bank, otherwise no responsibility will be accepted.*

Should any difficulty be experienced in procuring FLIGHT *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*